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New Jersey Road Exhibit, Louisiana Purchase Exposition  
View from Intra Mural Railway

ELEVENTH  
ANNUAL REPORT

OF THE

Commissioner of  
Public Roads

FOR THE YEAR ENDING  
OCTOBER 31st, 1904.



PATERSON, N. J.  
NEWS PRINTING COMPANY, STATE PRINTERS,  
1905.

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✓

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JAN. 14, 1927**



OFFICE OF COMMISSIONER OF PUBLIC ROADS.

TRENTON, NEW JERSEY, NOVEMBER 30th, 1904.

*To His Excellency Franklin Murphy, Governor, and the Legislature of New Jersey:*

As required by the State Aid Road Law, I have the honor to submit the eleventh annual report of the Commissioner of Public Roads for the fiscal year ending October 31st, 1904, with such comments, quotations and suggestions as existing circumstances seem to require.

H. I. BUDD,  
Commissioner of Public Roads.



# REPORT

In compliance with the act of April 1st, 1903, we make a statement of cost of roads that will claim this year's appropriation, as indicated by the figures below:

## COST OF ROADS.

### ATLANTIC COUNTY.

Pleasantville and Atlantic City road.....		1 mile.
Cost.....	\$32,890 73	
State's share.....	10,963 58	
Total number of miles.....		1.
Total paid the county.....		\$10,963 58

### BERGEN COUNTY.

Ridgewood avenue.....		1.68 miles.
Cost.....	\$6,459 00	
State's share.....	2,153 00	
Teaneck road, Ridgefield avenue, Hackensack road, Mt. Vernon street, Paulison avenue, Sixth Street, Central and Railroad avenues.....		3.62 miles.
Cost.....	\$33,573 32	
State's share.....	11,191 11	
Summit, Westwood and West Hillsdale avenues.....		.885 miles.
Cost.....	\$3,372 19	
State's share.....	1,124 06	
Fairview, Hillside, Washington, Lafayette and Fourth avenues, Westwood.....		3.19 miles.
Cost.....	\$9,860 58	
State's share.....	3,286 86	
Total number of miles.....		9.375
Total paid the boroughs.....		\$17,755 03

### BURLINGTON COUNTY.

Crosswicks street.....		.59 miles
Cost.....	\$3,013 83	
State's share.....	1,004 61	
Vincetown and Red Lion road.....		1.89 miles.
Cost.....	\$14,899 25	
State's share.....	4,966 42	
Total number of miles.....		2.48
Total paid the county.....		\$5,971 03

## ELEVENTH ANNUAL REPORT.

## CAMDEN COUNTY.

Westfield and Camden turnpike .....		5.985 miles.
Cost .....	\$29,453 00	..
State's share .....	9,817 67	
Total number of miles .....		5.985
Total paid the county .....		\$9,817 67

## CAPE MAY COUNTY.

Ocean City turnpike .....		2.23 miles.
Cost .....	\$25,420 05	
State's share .....	8,473 35	
Total number of miles .....		2.23.
Total paid the county .....		\$8,473 35

## CUMBERLAND COUNTY.

Mauricetown Bridge road .....	Length reported last year.	
Cost, extra embankment .....	\$22,850 07	
State's share .....	7,616 69	
Total number of miles .....	Length reported last year.....	
Total paid the county .....		\$7,616 69

## ESSEX COUNTY.

Swamp road .....		4.663 miles.
Cost .....	\$31,010 50	
State's share .....	10,336 83	
Hobart's Gap road .....		3.882 miles..
Cost .....	\$34,799 40	
State's share .....	11,599 80	
Total number of miles .....		8.545
Total paid the county .....		\$21,936 63

## MERCER COUNTY.

Extension of Scotch road .....		1.95 miles..
Cost .....	\$17,214 40	
State's share .....	5,738 13-1-3	
Princeton Hill road .....		.70 miles..
Cost .....	\$8,651 80	
State's share .....	2,883 93-1-3	
Harbourton road .....		1.70 miles.
Cost .....	\$15,257 20	
State's share .....	5,085 73-1-3	
Mercerville and Lawrence Station road .....		3.20 miles..
Cost .....	\$21,883 08	
State's share .....	7,294 36	
Total number of miles .....		7.55
Total paid the county .....		\$21,002 16.

## MIDDLESEX COUNTY.

Landing Bridge and New Market road .....		1.50 miles.
Cost .....	\$8,457 27	
State's share .....	2,819 26	

# COMMISSIONER OF PUBLIC ROADS.

7

Bridge Approach, Ridgeway avenue and Fourth Street. ....		1.25 miles.
Cost .....	\$14,127 14	
State's share .....	4,709 05	
Woodbridge and Oak Tree road, First Section .....		2.30 miles.
Cost .....	\$15,124 19	
State's share .....	5,041 39	
Extension of Sayreville road .....		2.53 miles.
Cost .....	\$21,504 10	
State's share .....	7,168 03	
Franklin Park road (one-half) .....		1.265 miles.
Cost .....	\$9,110 18	
State's share .....	3,036 73	
Inter County road (one-half) .....		.635 miles.
Cost .....	\$3,710 94	
State's share .....	1,236 98	
State Reform School road .....		.96 miles.
Cost .....	\$6,647 29	
State's share .....	2,215 76	
Morristown and Lawrence Harbor road .....		1.98 miles.
Cost .....	\$4,240 70	
State's share .....	1,413 57	
Total number of miles .....		12.42
Total paid the county .....		\$27,640 77

## MONMOUTH COUNTY.

Manalapan and Freehold road, Second Section .....		3.38 miles.
Cost .....	\$24,960 00	
State's share .....	8,320 00	
Matawan and Keyport road .....		1.83 miles.
Cost .....	17,043 20	
State's share .....	5,681 07	
Total number miles .....		5.21
Total paid the county .....		\$14,001 07

## MORRIS COUNTY.

Mount Freedom road or Newton turnpike .....		3.04 miles.
Cost .....	\$31,814 57	
State's share .....	10,604 86	
Lincoln Park, Montville and Boonton road, 2nd Section ..		2.94 miles.
Cost .....	\$24,650 29	
State's share .....	8,216 76	
Total number of miles .....		5.98
Total paid the county .....		\$18,821 62

## OCEAN COUNTY.

Eagleswood Main Shore road .....		3.05 miles.
Cost .....	\$7,848 10	
State's share .....	2,616 03	
Stafford Township road, First Section .....		2.31 miles.
Cost .....	\$5,326 60	
State's share .....	1,775 53	

## ELEVENTH ANNUAL REPORT.

Union Township Shore road .....		3.25 miles.
Cost .....	\$11,173 52	
State's share .....	3,724 51	
Ocean township—Shore Road .....		3.22 miles
Cost .....	\$11,890 59	
State's share .....	3,963 53	
Total number of miles .....		11.83
Total paid the county .....		\$12,079 60

## PASSAIC COUNTY.

Squirrel Wood's road .....		.60 miles.
Cost .....	\$5,877 90	
State's share .....	1,959 30	
Barbour street .....		.44 miles.
Cost .....	\$2,490 85	
State's share .....	830 28	
East Thirtieth street .....		.50 miles.
Cost .....	\$2,764 86	
State's share .....	921 62	
Total number of miles .....		1.54
Total paid the county .....		\$3,711 20

## SALEM COUNTY.

Salem and Pennsville road .....		5.87 miles.
Cost .....	\$34,328 02	
State's share .....	11,442 67	
Main Street and a Portion of Mullica Hill Turnpike .....		1.607 miles.
Cost .....	\$17,353 86	
State's share .....	5,784 62	
Total number of miles .....		7.477
Total paid the county .....		\$17,227 29

## SOMERSET COUNTY.

Franklin Park road (one-half) .....		1.265 miles.
Cost .....	\$9,110 19	
State's share .....	3,036 73	
Inter County road (one-half) .....		.635 miles.
Cost .....	\$3,710 94	
State's share .....	1,236 98	
Peapack road .....		4.20 miles.
Cost .....	\$22,312 77	
State's share .....	7,437 59	
Mountain avenue, Bound Brook .....		1.38 miles.
Cost .....	\$8,169 69	
State's share .....	2,723 23	
Davidson's Bridge road .....		3.20 miles.
Cost .....	\$16,939 17	
State's share .....	5,646 39	
Total number of miles .....		10.68
Total paid the county .....		\$20,080 92

# COMMISSIONER OF PUBLIC ROADS.

9

## SUSSEX COUNTY.

Tuttle's Corner road .....		1.695 miles.
Cost .....	\$12,315 17	
State's share .....	4,105 06	
Total number of miles .....		1.695
Total paid the county .....		\$4,105 06

## UNION COUNTY.

Centennial avenue, Cranford .....		.63 miles
Cost .....	\$3,320 97	
State's share .....	1,106 99	
Total number of miles .....		.63
Total paid the county .....		\$1,106 99

## WARREN COUNTY.

Danville road, Second Section .....		3.67 miles.
Cost .....	\$15,995 76	
State's share .....	5,331 92	
Stewartsville road, Second Section .....		2.44 miles.
Cost .....	\$13,484 18	
State's share .....	4,494 73	
Continuation of Morris turnpike .....		2.59 miles.
Cost .....	\$22,683 15	
State's share .....	7,561 05	
Roxburgh road .....		3.01 miles.
Cost .....	\$20,086 08	
State's share .....	6,695 36	
New Brunswick turnpike .....		1.38 miles.
Cost .....	\$10,818 86	
State's share .....	3,606 28	
Total number of miles .....		13.09
Total paid the county .....		\$27,689 34
Total number of miles paid for in 1904 .....		107.717
Total cost to the State .....		\$250,000 00
Appropriation .....		\$250,000 00

The following roads are approaching completion, but were not finished in time to receive the State's aid in 1904:

## ATLANTIC COUNTY.

	No. of Miles.	Cost.
Pleasantville and Atlantic City road .....	.58	\$35,000.00

## BERGEN COUNTY.

Midland Avenue .....	2.22	9,210 00
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## CAMDEN COUNTY.

Clementon road .....	1.40	\$11,811 26
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## HUDSON COUNTY.

Belleville turnpike .....	2.32	\$94,718 40
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## ELEVENTH ANNUAL REPORT.

## MIDDLESEX COUNTY.

South Amboy and Keyport road .....	1.00	\$8,577 00
Franklin Park road (one-half) .....	1.605	8,844 82
Plainsboro and Acqueduct road .....	1.41	7,813 40
Woodbridge and Oak Tree road, 2nd Section . . .	1.41	12,275 74
	<hr/> 5.425	<hr/> \$37,510 96

## MONMOUTH COUNTY.

Corliss avenue, Second Section .....	2.37	\$6,983 24
Oceanic and Sea Bright road .....	1.51	10,200 00
	<hr/> 3.88	<hr/> \$17,183 24

## OCEAN COUNTY.

Stafford Township road, Second Section .....	2.66	\$7,669 15
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## PASSAIC COUNTY.

Mountain View and Singac road .....	2.47	\$9,837 25
East Twenty-seventh street .....	.44	3,755 00
Paterson and Hamburg turnpike .....	3.713	11,895 00
	<hr/> 6.623	<hr/> \$25,487 25

## SOMERSET COUNTY.

Franklin Park road (one-half) .....	1.605	\$8,844 82
Total number of miles approaching completion .....		26.713
Total cost .....		\$247,435 08

Specifications for the following roads have been and are being prepared:

## ATLANTIC COUNTY.

	Miles.	Est. Cost.
May's Landing and Downstown .....	13.70	\$22,415 91

## BURLINGTON COUNTY.

Ballinger's Mills and Tabernacle .....	3.87	7,500 00
Ward avenue, Crosswicks .....	2.83	18,000 00
Rancocas and Burlington .....	3.89	25,000 00
Wrightstown and Bordentown .....	7.30	45,000 00
Keeler's Corner and Jacksonville .....	2.75	18,000 00
Pemberton and Vincentown .....	2.50	15,000 00
Mount Holly and Eayerstown .....	2.50	15,000 00
Lumberton and Cross Roads .....	3.25	20,000 00
Red Lion and Tabernacle .....	4.00	10,000 00
Chesterfield and Jacobstown .....	4.50	30,000 00
	<hr/> 37.39	<hr/> \$203,500 00



# COMMISSIONER OF PUBLIC ROADS.

11

## CAMDEN COUNTY.

Blackwood turnpike.....	7.39	\$45,000 00
Westfield turnpike.....	5.66	36,000 00
	<hr/> 13.05	<hr/> \$81,000 00

## ESSEX COUNTY.

Mount Pleasant avenue.....	1.12	\$9,000 00
Northfield and Morehousetown.....	1.75	14,000 00
South Orange avenue to Passaic River.....	1.13	9,500 00
Stuyvesant avenue, Irvington.....	2.75	22,000 00
Pier Lane, Caldwell.....	1.00	8,000 00
	<hr/> 7.75	<hr/> \$62,500 00

## MERCER COUNTY.

Trenton and New Brunswick turnpike.....	8.82	\$60,000 00
Hamilton Square and White Horse.....	3.70	22,000 00
Whitehead's Mill.....	1.00	6,000 00
Olden avenue.....	2.30	14,000 00
Vankirk.....	5.00	35,000 00
Yardville and Allentown turnpike.....	3.41	22,000 00
Pennington and Washington's Crossing.....	2.79	20,000 00
Grover's Mill.....	1.90	12,000 00
Windsor and Sharon.....	3.00	20,000 00
Liberty street.....	1.20	7,000 00
	<hr/> 33.12	<hr/> \$218,000 00

## MIDDLESEX COUNTY.

Franklin Park, Second Section (one-half).....	4.40	\$30,000 00
Landing Bridge and New Market, 2nd Section..	2.00	13,000 00
	<hr/> 6.40	<hr/> \$43,000 00

## MONMOUTH COUNTY.

Allentown and New Egypt.....	8.16	\$50,000 00
Blue Ball and Lakewood.....	8.16	20,000 00
Old Bridge.....	.64	5,000 00
Colt's Neck and Freehold.....	5.28	35,000 00
Asbury avenue, Asbury Park.....	3.54	30,000 00
West Long Branch.....	2.61	16,000 00
	<hr/> 28.39	<hr/> \$156,000 00

## OCEAN COUNTY.

Main Shore road, Lacey township.....	4.50	\$15,500 00
Main Shore road, Berkeley township.....	6.91	21,500 00
	<hr/> 11.41	<hr/> \$37,000 00

## ELEVENTH ANNUAL REPORT.

## SOMERSET COUNTY.

Franklin Park, Second Section (one-half) . . . . .	4.40	\$30,000 00
Rocky Hill . . . . .	5.60	33,339 66
Wagner's Corner . . . . .	1.08	5,683 24
	<hr/>	<hr/>
	11.08	69,022 90

## SUSSEX COUNTY.

Sparta and Newton, Second Section. . . . .	1.00	\$7,500 00
Sussex and Newton, Second Section . . . . .	1.00	7,500 00
Monroe Corner and Franklin. . . . .	2.00	8,600 00
Newton and Andover . . . . .	2.00	9,000 00
Stanhope and Andover. . . . .	1.00	5,200 00
Port Jervis. . . . .	1.00	5,300 00
Vernon . . . . .	2.00	9,000 00
	<hr/>	<hr/>
	10.00	\$52,100 00

## WARREN COUNTY.

Belvidere and Phillipsburg, Second Section. . . . .	3.00	\$16,500 00
Morris turnpike. . . . .	6.00	35,000 00
	<hr/>	<hr/>
	9.00	\$51,500 00

Total number of miles . . . . .	181.29
Total estimated cost . . . . .	\$996,038 81

THE FOLLOWING TABLE SHOWS THE NUMBER OF MILES OF ROAD BUILT IN EACH COUNTY, IN EACH YEAR, SINCE THE PASSAGE OF THE STATE AID LAW. ALSO THE NUMBER OF MILES BUILT EACH YEAR AND THE TOTAL NUMBER OF MILES BUILT IN EACH COUNTY.

	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	TOTAL NO. MILES BUILT IN EACH COUNTY
Atlantic.....	.....	.....	.....	.....	12	10	6.84	4.03	.....	7.03	20.10	13	1	74
Bergen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.02	27.98	9.375	10.395
Burlington.....	.....	10.54	20.46	9.75	11.02	10.48	15.03	18.36	8.96	17.36	19.131	27.98	2.49	171.621
Camden.....	.....	13.62	.....	8.25	.....	4.125	12.79	2.23	1	4.48	8.80	9.50	5.985	70.78
Cape May.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	5.394	6.20	2.23	19.824
Cumberland.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Essex.....	.....	.....	.....	6.50	6	4.91	9.276	12.07	9.60	9.36	8.723	5.79	1.22	8.545
Gloucester.....	.....	.....	.....	7.75	6	5.50	7.59	11.40	4.61	17.44	6.875	7.73	.....	74.895
Hudson.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marion.....	.....	.....	9.46	6.40	10.95	4.75	2.704	10.83	9.16	10.37	15.89	12.30	7.55	100.364
Middlesex.....	.....	.....	2.36	7.68	8.48	4.75	6.164	13.10	9.01	6.12	14.95	17.67	5.21	108.234
Monmouth.....	.....	10.55	3.18	.....	3.75	5	5.10	14.46	5.64	6.67	13.25	9.52	6.98	76.75
Morris.....	.....	.....	.....	.....	.....	6.13	6.30	10.46	6.53	4.306	10.079	7.13	5.98	56.915
Ocean.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Passaic.....	.....	.....	.....	.....	.....	4.79	5.48	8.67	6.73	3.987	6.57	6.09	1.54	25.70
Salem.....	.....	.....	.....	.....	2.67	.....	.....	2.17	2.05	.....	3.25	4.61	7.477	22.227
Somerset.....	.....	.....	.....	.....	.....	6.23	7.27	6.60	6.65	7.83	5.88	6.24	10.68	57.46
Sussex.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	893	.....	4.03	1.695	6.618
Union.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.203
Warren.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total built each year. . .	10,55	27.34	32.28	46.33	60.82	66.665	84.544	114.46	75.782	109.376	154.745	152.92	107.717	1,043.639

## ELEVENTH ANNUAL REPORT.

Names and lengths of the roads built in 1904:

## ATLANTIC COUNTY.

	Miles.	
Pleasantville and Atlantic City road.....	1.00	1.00

## BERGEN COUNTY.

Ridgewood avenue.....	1.68	
Teaneck road, Ridgefield avenue, Hackensack road, Mt. Vernon street, Paulison avenue, Sixth Street, Central and Railroad avenues.....	3.62	
Summit, Westwood and West Hillsdale avenues.....	.885	
Fairview, Hillside, Washington, Lafayette and Fourth avenues, Westwood.....	3.19	
	<hr/>	9.375

## BURLINGTON COUNTY.

Crosswicks street.....	.59	
Vincentown and Red Lion road.....	1.89	
	<hr/>	2.48

## CAMDEN COUNTY.

Westfield and Camden turnpike.....	5.985	5.985
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## CAPE MAY COUNTY.

Ocean City turnpike.....	2.23	2.23
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## ESSEX COUNTY.

Swamp road.....	4.663	
Hobart's Gap road.....	3.882	
	<hr/>	8.545

## MERCER COUNTY.

Extension of Scotch road.....	1.95	
Princeton Hill road.....	.70	
Harbourton road.....	1.70	
Mercerville and Lawrence Station road.....	3.20	
	<hr/>	7.55

## MIDDLESEX COUNTY.

Landing Bridge and New Market road.....	1.50	
Bridge Approach, Ridgeway Ave. and Fourth street.....	1.25	
Woodbridge and Oak Tree road, First Section.....	2.30	
Extension of Sayreville road.....	2.53	
Franklin Park road (one-half).....	1.265	
Inter County road (one-half).....	.635	
State Reform School road.....	.96	
Morristown and Lawrence Harbor road.....	1.98	
	<hr/>	12.42

# COMMISSIONER OF PUBLIC ROADS.

15

## MONMOUTH COUNTY

Manalapan and Freehold road, Second Section .....	3.38	
Matawan and Keyport road .....	1.83	
	<hr/>	5.21

## MORRIS COUNTY.

Mount Freedom road or Newton turnpike .....	3.04	
Lincoln Park, Montville and Boonton road, Second Section .....	2.94	
	<hr/>	5.98

## OCEAN COUNTY.

Eagleswood Main Shore road .....	3.05	
Stafford Township road, First Section .....	2.31	
Union Township Shore Road .....	3.25	
Ocean Township Shore road .....	3.22	
	<hr/>	11.83

## PASSAIC COUNTY.

Squirrel Wood's road .....	.60	
Barbour street .....	.44	
East Thirtieth street .....	.50	
	<hr/>	1.54

## SALEM COUNTY.

Salem and Pennsville road .....	5.87	
Main st. and a Portion of Mullica Hill turnpike .....	1.607	
	<hr/>	7.477

## SOMERSET COUNTY.

Franklin Park road (one-half) .....	1.265	
Inter County road (one-half) .....	.635	
Peapack road .....	4.20	
Mountain avenue, Bound Brook .....	1.38	
Davidson's Bridge road .....	3.20	
	<hr/>	10.68

## SUSSEX COUNTY.

Tuttle's Corner road .....	1.695	1.695
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## UNION COUNTY.

Centennial avenue, Cranford .....	.63	.63
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## WARREN COUNTY.

Danville road, Second Section .....	3.67	
Stewartsville road, Second Section.....	2.44	
Continuation of Morris turnpike .....	2.59	
Roxburgh road .....	3.01	
New Brunswick turnpike. ....	1.38	
	<hr/>	13.09
		<hr/>
		107.717

The total amount expended by the State and the number of miles paid for in each county since the passage of the State Aid Law are as follows:

County.	Miles.	Amount.
Atlantic .....	74.00	\$61,250 78
Bergen.....	10.395	19,070 34
Burlington .....	171.521	258,254 80
Camden .....	70.78	129,219 14
Cape May .....	19.824	31,041 55
Cumberland .....	1.22	14,773 23
Essex .....	80.774	177,684 27
Gloucester .....	74.895	85,128 27
Hudson .....	2.44	8,944 60
Mercer .....	100.364	251,925 76
Middlesex .....	108.234	189,202 72
Monmouth .....	76.75	128,210 82
Morris .....	56.915	111,674 16
Ocean .....	25.70	27,545 43
Passaic .....	43.857	62,772 00
Salem .....	22.227	30,980 47
Somerset .....	57.48	92,850 76
Sussex .....	6.618	12,284 70
Union .....	6.203	8,796 50
Warren .....	33.332	63,558 25
	<hr/>	<hr/>
	1,043.529	\$1,765,168 55

AMOUNT AVAILABLE FOR ROAD BUILDING IN EACH COUNTY.

Under the State Aid Law, the estimated cost of all improvements made under this act, together with the estimated cost of repairs of roads already constructed in any county in any one year, shall not exceed one-half of one per centum of the ratables of such county for the last preceding year.

The following table will show at a glance the limitations of expenditures in each county, also the amount that can be expended, provided the state appropriation is liberal enough to meet it. For example: Atlantic county, with ratables amounting to \$54,768,123.00, could expend per year, if state appropriation were sufficient, \$273,840.61, a rate, if applied to all the counties, even with the cost of repairs to roads already built deducted, would, in a few years, cover all our leading roads with stone and gravel:

County.	Abstract of Ratables for 1904.	One-half of one per cent.
Atlantic .....	\$54,768,123 00	\$273,840 61
Bergen .....	46,704,264 00	233,521 32
Burlington .....	23,620,111 00	118,100 55
Camden .....	48,952,914 00	244,764 57
Cape May .....	9,990,000 00	49,950 00
Cumberland .....	18,074,000 00	90,370 00
Essex .....	245,671,200 00	1,228,356 00
Gloucester .....	15,858,978 00	79,294 89
Hudson .....	196,436,982 65	982,184 91
Hunterdon .....	18,012,840 00	90,064 02
Mercer .....	54,114,485 00	270,572 42
Middlesex .....	34,647,650 00	173,238 25
Monmouth .....	56,127,070 00	280,635 35
Morris .....	30,475,205 00	152,376 02
Ocean .....	9,990,001 00	49,950 00
Passaic .....	76,752,626 00	383,763 13
Salem .....	14,249,965 00	71,249 82
Somerset .....	19,705,392 00	98,526 96
Sussex .....	12,341,393 00	61,706 96
Union .....	49,595,700 00	247,978 50
Warren .....	19,290,160 00	96,450 80

The following roads have been and are being petitioned for, to be improved under the State Aid Act:

ATLANTIC COUNTY.

	Miles.	Est. Cost.
May's Landing and Tuckahoe—gravel .....	11.00	\$22,000 00
Hammonton and Atsion—gravel .....	8.00	24,000 00
Chestnut Neck and Egg Harbor—gravel .....	9.00	18,000 00
	<hr/> 28.00	<hr/> \$64,000 00

## BURLINGTON COUNTY.

Pemberton and Vincentown—stone . . . . .	2.50	\$15,000 00
Pemberton and Turpentine—stone . . . . .	6.00	36,000 00
Masonville and Coates' Corner—stone . . . . .	3.50	21,000 00
Cross Road and Green Tree—stone . . . . .	2.50	15,000 00
Green Tree Pike—stone . . . . .	2.00	12,000 00
Indian Mills, Atsion and Batsto—gravel . . . . .	9.50	19,000 00
Pemberton and Wrightstown—stone . . . . .	6.00	36,000 00
Burlington and Jacksonville—stone . . . . .	6.00	36,000 00
Rancocas and Burlington—stone . . . . .	4.00	24,000 00
Recklesstown and Mansfield—stone . . . . .	1.60	9,000 00
Ward avenue, Crosswicks—stone . . . . .	3.50	21,000 00
Wrightstown and Rising Sun—stone . . . . .	7.00	42,000 00
Keeler's Corner and Jacksonville—stone . . . . .	2.00	12,000 00
Hartford and Bridgeboro—stone . . . . .	3.30	20,000 00
Bordentown and Groveville—stone . . . . .	3.00	18,000 00
Auback and Groveville bridge—stone . . . . .	2.00	12,000 00
Georgetown and Wrightstown—gravel . . . . .	4.00	8,000 00
Bordentown and Florence—stone . . . . .	5.00	30,000 00
Florence Station to Burlington City line—stone . .	4.00	24,000 00
Mount Laurel and Hainesport—stone . . . . .	7.00	42,000 00
Ballenger's Mills and Tabernacle—gravel . . . . .	4.00	8,000 00
Tabernacle and Chatsworth—gravel . . . . .	10.50	21,000 00
New Egypt and Chatsworth—gravel . . . . .	12.00	24,000 00
Mount Holly and Rancocas—stone . . . . .	4.00	24,000 00
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	114.90	\$529,000 00

## CAMDEN COUNTY.

Spring's Mills and Sicklerville—gravel . . . . .	6.00	\$12,000 00
Haddonfield and Gibbsboro—stone . . . . .	4.00	24,000 00
Cove—stone . . . . .	1.78	10,000 00
Berlin and Milford—gravel . . . . .	5.00	10,000 00
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	16.78	\$56,000 00

## CUMBERLAND COUNTY.

Bridgeton and Roadstown—gravel . . . . .	5.00	\$10,000 00
Fortescue—gravel . . . . .	2.00	10,000 00
Malaga and Millville—gravel . . . . .	6.00	12,000 00
	<hr/>	<hr/>
	13.00	\$32,000 00

## ESSEX COUNTY.

West Livingston and Northfield Church,—stone . .	1.34	\$11,500 00
Fifth avenue, Verona—stone . . . . .	1.00	7,500 00
Wall street and Stuyvesant avenue, Vailsburg— stone . . . . .	3.00	24,000 00
Newark Plank—stone . . . . .	.47	15,000 00
Mount Pleasant avenue—stone . . . . .	1.12	9,000 00



# COMMISSIONER OF PUBLIC ROADS.

19

Northfield and Morehousetown—stone .....	1.75	14,000 00
South Orange avenue to Passaic river,—stone ..	1.13	9,500 00
Pier Lane, Caldwell—stone .....	1.00	8,000 00
	<hr/>	
	10.81	\$98,500 00

## GLOUCESTER COUNTY.

Glassboro and Mullica Hill—gravel .....	6.50	\$13,000 00
Chapman's Mill road, Mullica Hill to Swedesboro gravel .....	4.50	9,000 00
Jefferson and Paulsboro—gravel .....	5.50	11,000 00
Glassboro and Bridgeton—gravel .....	6.50	13,000 00
Auburn road, Swedesboro to Auburn—stone ...	3.50	21,000 00
Almonesson and Westville—stone .....	4.00	24,000 00
	<hr/>	
	30.50	\$91,000 00

## HUDSON COUNTY.

Newark Plank road—stone .....	1.32	\$35,000 00
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## HUNTERDON COUNTY.

Middle Valley to Morris county line—stone . . .	2.50	\$10,000 00
Rockaway Valley and New Germantown—stone	1.50	6,000 00
Lambertville and Ringoes—stone .....	6.00	30,000 00
Woodsville and Ringoes—stone .....	4.00	20,000 00
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	14.00	\$66,000 00

## MERCER COUNTY.

Hamilton Square and White Horse—stone . . . .	3.70	\$22,200 00
Trenton and Princeton turnpike—stone .....	8.30	49,800 00
Whitehead's Mill—stone .....	1.00	6,000 00
Liberty street—stone .....	1.20	7,200 00
Vankirk—stone .....	5.00	30,000 00
Grover's Mills—stone .....	1.90	11,400 00
Windsor and Sharon—stone .....	3.00	18,000 00
Pennington and Washington's Crossing—stone .	2.50	15,000 00
Extension Trenton and Allentown turnpike— stone .....	3.20	19,200 00
	<hr/>	
	29.80	\$178,800 00

## MIDDLESEX COUNTY.

Highland Park and Bonamtown—stone .....	3.00	\$18,000 00
Milltown and Spotswood—stone .....	4.00	24,000 00
Clifton and Ryder's Lane—stone .....	3.00	18,000 00
Rahway and Woodbridge—stone .....	4.00	24,000 00
Landing and New Market—stone .....	2.00	12,000 00
	<hr/>	
	16.00	\$96,000 00

## ELEVENTH ANNUAL REPORT.

## MONMOUTH COUNTY.

Amboy and Keyport—stone . . . . .	2.00	\$12,000 00
Middlesex and Red Bank—stone . . . . .	3.85	19,140 00
Red Valley and Allentown—stone . . . . .	6.25	36,343 00
Blue Ball and Freehold—gravel . . . . .	3.00	6,000 00
Englishtown and Freehold—gravel . . . . .	5.03	17,449 00
Sweetman's Lane and Black's Mills—gravel . . . . .	2.95	4,500 00
	<hr/>	
	23.08	\$95,432.00

## MORRIS COUNTY.

James street to Somerset county line—stone . . . . .	2.62	\$16,000 00
Long Hill and Gillette—stone . . . . .	2.00	12,000.00
Chester to Lackawanna railroad—stone . . . . .	.96	4,915 00
New Vernon (Sand Springs)—stone . . . . .	2.00	12,000 00
Whippany and Swinefield bridge—stone . . . . .	5.00	30,000 00
Pompton and Pequannock river—stone . . . . .	2.80	16,000 00
Passaic and Mountain View—stone . . . . .	2.60	15,000 00
Morristown and Speedwell Lake—stone . . . . .	2.00	12,000 00
Lower Mine Hill—stone . . . . .	1.66	9,000 00
Denville and Boonton—stone . . . . .	4.54	27,000 00
Troy Hills and Whippany—stone . . . . .	3.34	20,000 00
	<hr/>	
	29.52	\$173,915 00

## OCEAN COUNTY.

Long Beach—gravel . . . . .	15.00	\$30,000 00
Seaside Park—gravel . . . . .	12.00	24,000 00
	<hr/>	
	27.00	\$54,000 00

## PASSAIC COUNTY.

Lackawanna avenue—stone . . . . .	2.00	\$10,000 00
Norton House and Bergen county line—stone . . . . .	2.00	10,000 00
Midvale and Greenwood Lake—stone . . . . .	10.00	50,000 00
Briggs avenue—stone . . . . .	1.32	5,500 00
Lafayette avenue—stone . . . . .	.56	2,300 00
Green—stone . . . . .	1.30	5,500 00
	<hr/>	
	17.18	\$83,300 00

## SALEM COUNTY.

Salem and Woodstown—shell . . . . .	4.00	\$12,000 00
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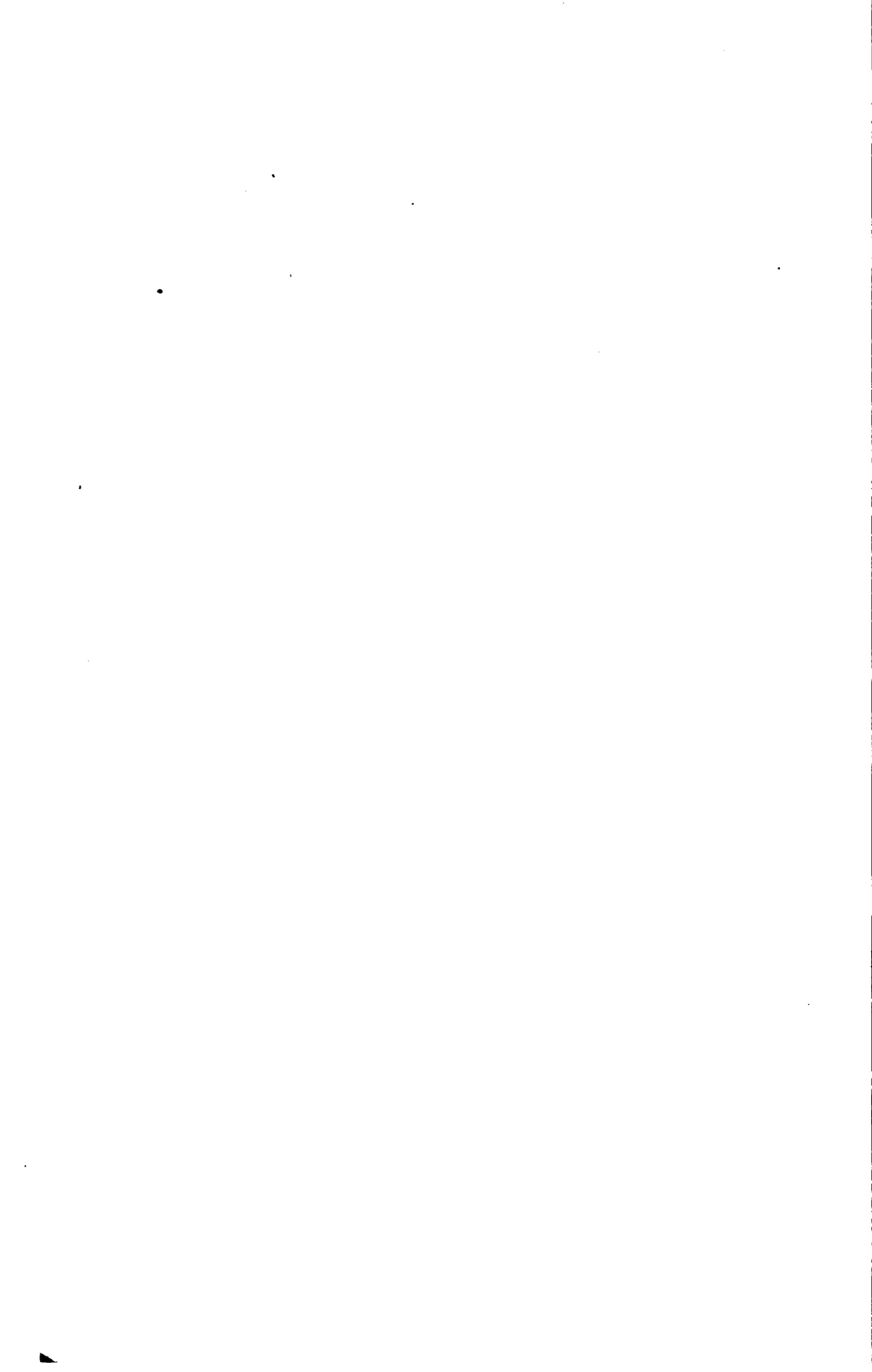
# COMMISSIONER OF PUBLIC ROADS.

21

## SOMERSET COUNTY.

Union avenue, Somerville to Raritan—stone . . .	2.16	\$11,000 00
Plainfield and Morristown—stone . . . . .	2.50	15,000 00
Dead River and Liberty Corner—stone . . . . .	3.00	15,000 00
Stoutsburg and Plainville stone . . . . .	4.50	26,000 00
Basking Ridge and Van Dorn's Mills—stone. . . .	2.33	12,000 00
Franklin Park and Middlebush—stone . . . . .	5.00	25,000 00
Labaw's Corner and Princeton—stone . . . . .	4.06	20,000 00
Union avenue and Blackwell's Mill, Findern— stone . . . . .	6.50	33,000 00
Pleasant View Schoolhouse and Millstone—stone	4.75	24,000 00
Millstone and Wood's Tavern—stone . . . . .	3.25	16,000 00
Bedminster and Lamington—stone. . . . .	4.50	23,000 00
Far Hills and Liberty Corner—stone . . . . .	4.00	22,000 00
Bernardsville and New Vernon—stone . . . . .	3.00	18,000 00
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	49.55	\$260,000 00

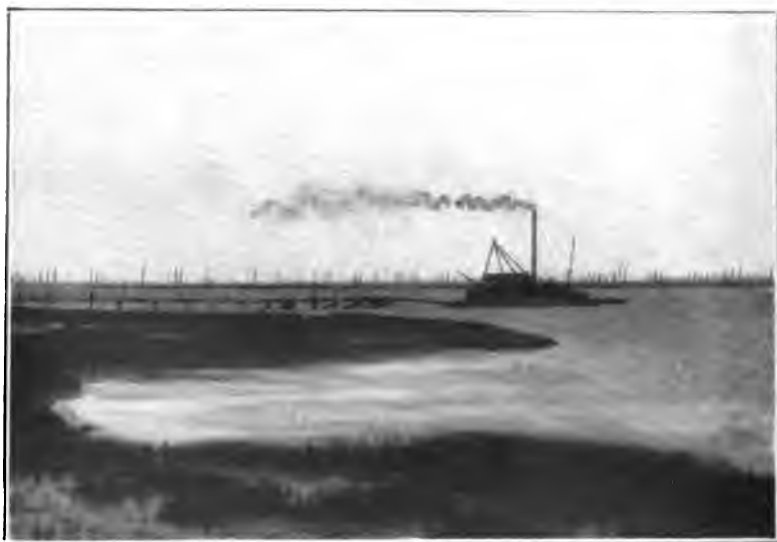
Total number of miles petitioned for in all the counties . . . . .	425.44
Total estimated cost of all the roads petitioned for . . . . .	\$1,924,947 00







**Discharging Sand, Atlantic City and Pleasantville Boulevard  
Atlantic County**



**Dredge Pumping Sand, Atlantic City and Pleasantville Boulevard  
Atlantic County**

# Description of Roads Improved in 1904.

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## ATLANTIC COUNTY.

### *Pleasantville and Atlantic City Road, 3.58 Miles Long.*

This road begins at the borough of Pleasantville and extends to Atlantic City. It is constructed of gravel, sixty feet wide and six inches thick. For detailed description see 1903 report.

The grading on this road is practically completed and they are at present spreading the gravel. The road was and is practically level.

The total cost to November, 1903, was \$33,859.47.

The total cost to November, 1904, was \$64,849.98.

## BERGEN COUNTY.

This county, as a county, builds no roads, but its numerous boroughs and one township have availed themselves of the provisions of the State Aid Law during the past year.

### *Ridgewood Avenue, 1.68 Miles Long.*

This avenue begins at the borough line of Delford and extends through Midland township to the macadam roads of the Saddle River Valley.

By means of this macadam, which is twelve feet wide and five inches thick, the two through north and south road systems of Bergen County are connected.

Colfax and Steele, Pompton, New Jersey, were the contractors.

The maximum grade was reduced from 9 per cent. to 6 per cent.

The price per contract, lump sum, was \$6,459.00.

The total cost was \$7,256.00.

Teaneck Road, Ridgely Avenue, Hackensack Road, Mt. Vernon Street, Paulison Avenue, Sixth Street, Central Avenue, and Railroad Avenue, total length, 3.62 miles.

The first of these roads begins at the Bergen turnpike and runs northerly, along the easterly side of the village of Ridgefield Park, to the village limit, where it connects with the improved road running northwardly to the New York State line. The other roads form a continuous line, through the village of Ridgefield Park, from the Bergen turnpike to the extreme northwesterly limit of the village.

These improved streets and roads make an outlet from the Bergen turnpike to the country lying north and west. The latter line is of particular benefit to the inhabitants of Ridgefield Park, in that it furnishes a good, smooth, hard road over which to travel to Hackensack, the county seat, and it further enables them to avoid the annoyance, delay and expense of that relic of antiquity,—the toll gate. The other name for this highway, in the early history of our State, would have been shun-pike.

While these roads are of immediate advantage to the inhabitants of Ridgefield Park, they are equally serviceable to the many people living along the easterly bank of the Hackensack river and north of the village, affording one and all a means of quick and easy access to the markets of Jersey City and New York. They are of telford construction, sixteen feet wide and ten inches thick in the low, wet sections, and of macadam, sixteen feet wide and six inches thick through the remaining portions.

James S. Sowerbutt, Paterson, New Jersey, was the contractor.

The maximum grade was reduced from 11.50 per cent. to 5.53 per cent.

The price per contract, lump sum, was \$32,152.00.

The total cost was \$36,054.44.

*Summit, Westwood and West Hillsdale Avenue, .885 Miles Long.*

These streets from a continuation of the work done last year, and serve to bring the improvements already made into closer contact, making one and all more valuable. When a few short gaps are filled, we will have a continuous improved road from Jersey City to the New York State line. The entire work is of macadam, fourteen feet wide and six inches thick.

John C. Gardenier was the contractor.

The maximum grade was reduced from 5.4 per cent. to 3.1 per cent.

The price per contract, lump sum, was \$3,638.58.

The total cost was \$3,648.19.







**Red Lion and Vincentown Stone Road, Burlington County  
Before Improvement**



**Red Lion and Vincentown Stone Road, Burlington County  
After Improvement**

*Fairview, Hillside, Washington, Lafayette and Fourth Avenues, Borough of Westwood, 3.19 Miles Long.*

These are another series of streets through a Bergen county borough. They form connecting links in the chain of good roads built along the Hackensack valley, and also join these with those of the Saddle river valley, thus making both systems of improved highways more valuable to the traveling public. They are constructed of macadam, twelve and fourteen feet wide and four inches thick.

Gurnee and Van Buskirk were the contractors.

The maximum grade was reduced from 8.00 per cent. to 4.39 per cent.

The price per contract, lump sum, was \$23,442.76.

The total cost was \$10,536.75.

#### BURLINGTON COUNTY.

*Bordentown and Crosswicks Turnpike Extension or Crosswicks Street, .59 Miles Long.*

The work done under this contract completes the improvement of the old turnpike from Crosswicks to Main Street, Bordentown, thus giving the farmers of Crosswicks and Chesterfield an improved road right into the heart of the city of Bordentown.

The completion of the macadamizing of the old turnpike up to the city limits last year, rendered the necessity for the continuation of the improvement to Main street so obvious that the Board of Freeholders of Burlington county amended their resolution not to build any new roads this year, in so far as it applied to this short stretch of road. It is built of macadam, twelve feet wide and six inches thick.

J. R. Shanley, New York City, was the contractor.

The maximum grade was and is 2.80 per cent.

The price per contract, lump sum, was \$2,750.00.

The total cost was \$3,218.83.

*Vincentown and Red Lion Road, 3.50 Miles Long.*

This road begins at Vincentown and extends to Red Lion. It is constructed of macadam, twelve feet wide and six inches thick. For fuller description see 1903 report.

J. R. Shanley, New York City, was the contractor.

The maximum grade was reduced from 5 per cent. to 1.80 per cent.

The price per contract, lump sum, was \$24,334.00.

The total cost of the first section, or 1.61 miles, paid for in 1903, was \$11,175.00. Total cost of second section, or 1.89 miles, paid for in 1904, was \$16,063.30.

#### CAMDEN COUNTY.

##### *Westfield and Camden Turnpike, 5.985 Miles Long.*

This turnpike, which has been in existence over twenty years, extends through a rich and well cultivated farming section. It is a great thoroughfare for the many heavily loaded truck teams that carry the productions of the soil to the Camden and Philadelphia markets. The whole country surrounding is a veritable truck and fruit section, interspersed here and there with small towns.

The counties of Burlington and Camden have bought this pike, and by this means the farmers are relieved from paying the heavy toll which has been imposed upon them for many years.

The entire road will, in the near future, have to be resurfaced, because a portion of it is built of gravel and the remainder of stone, which is well worn; therefore, in order to make a good road, it will be necessary, within the next one or two years, to spread a fresh coating of stone over the entire length of the road.

The purchase price was \$32,203.00.

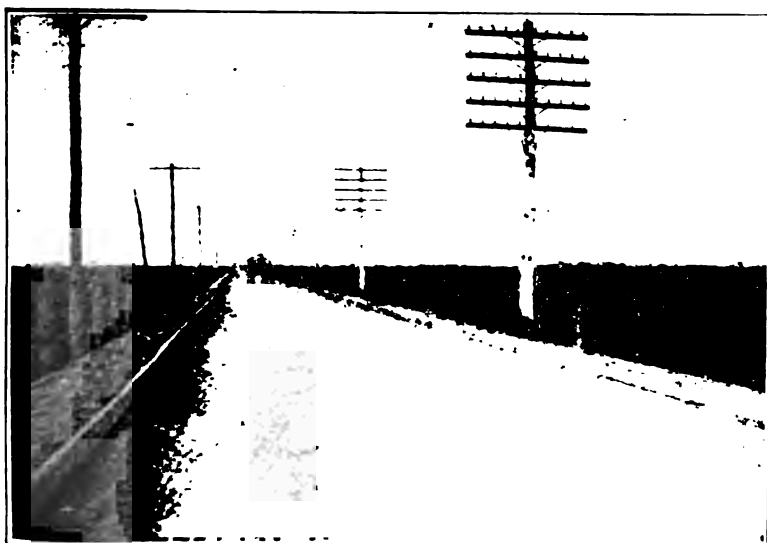
#### CAPE MAY COUNTY.

##### *Ocean City Turnpike, 2.23 Miles Long.*

This road, which extends across the salt meadows from Ocean City to the mainland, might more properly be termed a causeway. It embraces several new features of construction, and, therefore, is worthy of special attention. The meadow over which it is built forms, in many places, a very uncertain foundation. To overcome this difficulty, it was thought best to protect it on each



Ocean City Turnpike, Cape May County  
After Improvement



Ocean City Turnpike, Cape May County  
After Improvement

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...

side by a double row of piles, connected by planks, thus forming a retaining wall, four feet in width, on each side of the road. This space was carefully filled in and consolidated. As a further precaution, a bank of turf was placed inside of the inner planks, the better to retain the gravel of which the road is constructed. The results thus far obtained have equaled the expectations of the constructors, and, judging from present appearances, solves the problem of road construction across the salt meadows. It furnishes a safe, sure and free highway, secure from the encroachments of the tides at all seasons of the year, something longed for for many years.

This road was formerly a turnpike, but as the tolls received did not seem to warrant keeping the road in the condition the traveling public demanded, it was deemed best for all parties that it should be made a public road. The results achieved have already proved the wisdom of the state's and county's action. It is constructed of gravel, fourteen feet wide, six to eight inches thick on the upland, and four inches thick on the lowland.

Robert E. Hand, Erma, New Jersey, was the contractor.

The maximum grade was reduced from 2.34 per cent. to 1.50 per cent.

The price per contract, lump sum, was \$25,420.05.

The total cost was \$26,944.05.

#### CUMBERLAND COUNTY.

##### *Mauricetown Bridge Road, 1.22 Miles Long.*

This road begins at the center of Port Elizabeth and Dorchester road, and extends to the east end of the Mauricetown bridge. It is built of gravel, fourteen and twenty feet wide, and twelve inches thick.

Owing to the excessive settlement of the embankment, it was necessary to spend the further sum of \$23,525.07 in addition to the amount expended last year, which was \$21,469.62. The road is now completed and is on a firm, solid, permanent foundation.

Alfred H. Lupton, Bridgeton, New Jersey, was the contractor.

The maximum grade was reduced from 2.9 per cent. to 1.3 per cent.

The total cost was \$44,994.69.

## Essex County.

*Swamp Road, 4.663 Miles Long.*

This road begins at Bloomfield avenue, Caldwell, and extends to Mount Pleasant avenue, Livingston. It is constructed of telford, sixteen feet wide and eight inches thick.

This road affords a northerly and southerly connection for the extreme westerly portion of Essex county, giving the people an outlet to Millburn, Summit, Chatham and Short Hills on the south, and Little Falls and Paterson on the north. The principal products transported over this road are milk and summer boarders, to both of which this section owes to a large extent its present prosperity, and by means of this improvement they hope to derive increased pecuniary benefit.

Robert Wright and Stuart Lindsley, Orange, New Jersey, were the contractors.

The maximum grade was reduced from 11 per cent. to 3.24 per cent.

The price per contract, lump sum, was \$31,010.50.

The total cost was \$31,010.50.

*Hobart's Gap Road, 3.882 Miles Long.*

This road begins at the Northfield road, Livingston township, and extends to the Morris turnpike. It is constructed of telford, sixteen feet wide and eight inches thick.

This road gives the inhabitants of Western Essex their only direct outlet to Short Hills, Chatham and Madison, connecting on top of the mountain with the improved roads to Orange and Newark. It forms one of the most picturesque drives in Essex county, passing, as it does, through the famous Hobart's Gap, which, of late years, has been equally noted for its beauty and inaccessibility.

Charles A. and Herbert Lighthipe, Millburn, New Jersey, were the contractors.

The maximum grade was reduced from 16.64 per cent. to 4.53 per cent.

The price per contract, lump sum, was \$34,404.90.

The total cost was \$34,799.40.





*Harbourton Road, 1.70 Miles Long.*

This road begins at Birmingham and extends northwardly to Goulding's farm. It is constructed of macadam, fourteen feet wide and six inches thick. It is a continuation of the Asylum road, which was built in 1899. This carries Mercer county's road improvement still farther toward her northern boundary, giving the farmers and dairymen of that section the same ease of access to the county seat and commercial center of the county that the other sections already possess.

The surface of this road was quite hilly and broken, and necessitated considerable grading, as will be readily seen when we learn that the maximum grade has been reduced from 9 to 3.9 per cent. If nothing beyond the grading had been done the past year, that alone would have been a vast improvement.

John T. Carr and Company, Trenton, New Jersey, were the contractors.

The maximum grade was reduced from 9 per cent to 3.9 per cent.

The price per contract, lump sum, was \$12,281.00.

The total cost was \$16,061.63.

*Mercerville and Lawrence Station Road, 3.20 Miles Long.*

The road, which has been improved this year from Mercerville to the Pennsylvania railroad, near Lawrence station, is a portion of the old Colonial thoroughfare between Princeton and Bordentown, a road made famous in Revolutionary history. It passes through a very rich farming district, and, consequently, is of great value, not only to the farmers living along each side of it, but also to the inhabitants of Trenton, as over its surface are hauled many hundreds of tons of farm produce for the tables of the busy workers of Trenton. Like all rich farm land, the natural soil makes a very bad road material in wet weather; consequently, it was almost impossible, before the road was macadamized, for the farmers to haul their produce to market in bad weather, and it was a common occurrence to see not only farm wagons, but buggies fast in the mire. Now, the transportation problem has been successfully solved by covering the road with a coat of macadam, fourteen feet wide and six

inches thick, and, as it connects at Mercerville with the road already improved into Trenton, all of the people along the line of the improvement are assured of a good road to Trenton at all seasons of the year.

The C. B. Walton Company, Trenton, New Jersey, was the contractor.

The maximum grade was reduced from 4 per cent. to 2.25 per cent.

The price per contract, lump sum, was \$18,228.00.

The total cost was \$22,769.16.

#### MIDDLESEX COUNTY.

##### *Landing Bridge and New Market Road, 1.50 Miles Long.*

Beginning at the Landing bridge approach, this improvement extends easterly down the river for a distance of one thousand feet, thence northerly toward the Stelton road, following the course of a small, well watered valley, along which are many dairy farms, whose owners are greatly benefitted by this good road, as, owing to the nature of their occupation, they are compelled to use it every day. In addition to this, the road has a further value, in that it forms a more direct route to New Market, Dunellen, and the many cities and towns lying north of New Brunswick.

This road is constructed of macadam, twelve feet wide, eight inches thick, and is one of the best finished roads built this year.

John H. Hurley, Trenton, New Jersey, was the contractor.

The maximum grade was reduced from 7.5 per cent. to 4 per cent.

The price per contract, lump sum, was \$8,495.86.

The total cost was \$9,015.69.

##### *Bridge Approach, Ridgeway Avenue and Fourth Street, 1.25 Miles Long.*

This avenue commences at the southerly end of the new bridge across the Raritan river, and extends for a distance of three thousand feet, over a private right of way, to Ridgeway avenue, thence along Ridgeway avenue under the tracks of the P. R. R.

to Fourth street, thence along Fourth street to the end of the present macadam. It is built of macadam, sixteen and eighteen feet wide and six inches thick.

This improved road, in connection with the new wagon road bridge, completes the most difficult and expensive portion of our projected shore line road from Jersey City to Atlantic City. The completion of this work brings Jersey City, Newark and other portions of northern New Jersey seventeen miles nearer the Atlantic coast resorts.

Rue and Fountain, Old Bridge, New Jersey, were the contractors.

The maximum grade was reduced from 7 per cent. to 5 per cent.

The price per contract, lump sum, was \$13,647.14.

The total cost was \$17,144.50.

#### *Woodbridge and Oak Tree Road, First Section, 2.30 Miles Long.*

Commencing in Woodbridge at Rowland's Corner, on the line of the Rahway stone road, the work has been carried forward this year to the Pennsylvania railroad at Iselin station.

As the soil over which this road is built was of a very heavy, clayey nature, the change is very marked. In place of deep ruts and large mud holes, we have a smooth, hard pavement, twelve feet wide, flanked on either side by a well shaped, thoroughly compacted shoulder, eight feet in width. The depth of the macadam in the center is eight inches.

Delaware River Quarry and Construction Company, Jersey City, New Jersey, was the contractor.

The maximum grade was reduced from 5.37 per cent. to 3.10 per cent.

The price per contract, lump sum, was \$15,124.19.

The total cost was \$15,682.73.

#### *Extension of Sayreville Road, 2.53 Miles Long.*

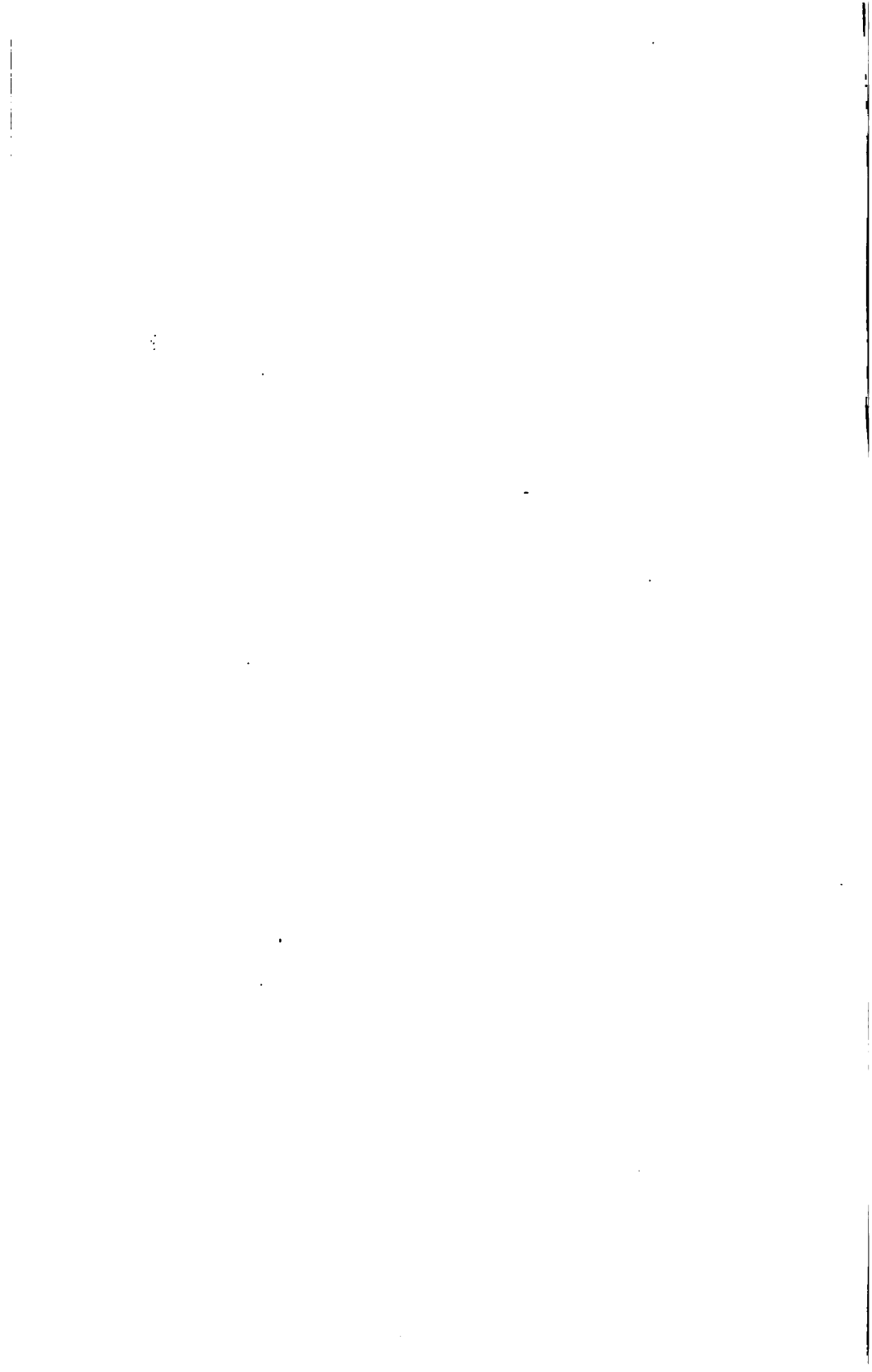
The finishing of this macadam pavement marks the completion of the through line from New Brunswick to South Amboy. It was built through a very rough and hilly region, and over a deep, sandy soil. The changes made by the improvement of this



**Bridge Approach, Ridgeway Avenue and Fourth Street, Middlesex County  
Before Improvement**



**Bridge Approach, Ridgeway Avenue and Fourth Street, Middlesex County  
After Improvement**



road are very marked. Formerly an empty wagon was almost a load in itself; now heavy weights are transported over it with comparative ease. This road is of great value to the owners of the large clay pits situated near it, and also to the inhabitants of Sayreville and the other villages along its line. It is constructed of macadam, twelve feet wide, eight inches thick.

John H. Hurley, Trenton, New Jersey, was the contractor.

The maximum grade was reduced from 5 per cent to 2.25 per cent.

The price per contract, lump sum, was \$13,328.09.

The total cost was \$22,517.47.

*Franklin Park Road, 5.74 Miles Long, 2.53 Miles of Which  
Were Completed This Year.*

This old stage road begins at New Brunswick and extends westwardly to and through Franklin Park. It is a portion of the main highway between New Brunswick and Trenton, and, with few exceptions, it has maintained its original width of sixty-six feet. It is built of macadam, twelve feet wide and eight inches thick, except forty-five hundred feet through low, wet land, which is of telford, eleven inches thick.

The work was carried forward through a red shale country, which has long been famous for the quality and abundance of its farm products. The houses and farm buildings along the line attest the prosperity of the owners, but this soil, while admirably adapted to the production of crops, is, at certain seasons of the year, the worst and least desirable for road purposes, inasmuch as it absorbs and retains a large percentage of the water which falls upon it, the result being that during rainy seasons this highway was in many places almost impassable. Now, all this is changed. Anyone may travel over this pavement, so far as completed, with ease, comfort and safety, and this famous old road promises soon to regain its former popularity. When the five mile gap between this and the Inter County road from Kingston is closed, the State will have one of the finest thoroughfares to be found in the United States.

Moran and Sutton, New Brunswick, New Jersey, were the contractors.

The maximum grade was reduced from 3.78 per cent. to 2.50 per cent.

The price per contract, lump sum, for 2.53 miles, was \$18,220.37.

The total cost of 2.53 miles was \$19,471.68.

*State Reform School Road, .96 Miles Long.*

When one views the great work being done and the number of youths being cared for in such an able manner, the wonder grows that, with the great improvements made and good accomplished, this road, which connects the State Reform School with the outside world, has been so long neglected. Now, the question asked is, "Why was it not done long ago?"

This stretch of macadamizing, twelve feet wide and eight inches thick, converts what was almost an impassable slough, into a good, smooth road, and is much more in keeping with the buildings and grounds of this State institution.

James H. Butcher, Ardena, New Jersey, and Charles R. Le Compte, Lakewood, New Jersey, were the contractors.

The maximum grade was reduced from 5.50 per cent. to 4.10 per cent.

The price per contract, lump sum, was \$6,495.74.

The total cost was \$6,996.20.

*Morristown and Lawrence Harbor Road, 1.98 Miles Long.*

This road begins at Hall's Corner, Morristown, and extends northwardly to Lawrence Harbor, a summer resort located on the bluff overlooking Raritan Bay. As it is a continuation of a gravel road, it is built of gravel, twelve feet wide and from six to ten inches thick.

This is one of the several branch gravel roads which have been built in the county of Middlesex to connect with the through lines that are constructed of stone. Its completion was delayed for some time, because both the county and railroad authorities wished to do away with a very dangerous grade crossing. This has now been accomplished by a slight variation of the line, thus carrying it over the railroad tracks by means of a bridge.

Rue and Fountain, Old Bridge, New Jersey, were the contractors.





**Lawrence Harbor Road, Madison Township, Middlesex Connty  
Before Improvement**



**Lawrence Harbor Road, Madison Township, Middlesex County  
After Improvement**







**Manalapan and Freehold Road, Monmouth County  
Before Improvement**



**Manalapan and Freehold Road, Monmouth County  
After Improvement**

The maximum grade was reduced from 10.00 per cent to 4.20 per cent.

The price per contract, lump sum, was \$3,050.00.

The total cost was \$5,166.90.

#### MONMOUTH COUNTY.

##### *Manalapan and Freehold Road, Second Section, 3.38 Miles Long.*

Beginning at Millhurst, where last year's work stopped, the macadamizing has been carried forward, over a succession of sand hills and deeper, sandier hollows, to the county seat of Monmouth county. By this means two of the old, historic towns of the State are connected, namely, Trenton and Freehold.

It is hoped in the near future to extend this good work to the seashore at Long Branch. The pavement is of macadam, fourteen feet wide and eight inches thick, and makes this old turnpike, of which the county was ashamed, a thing of beauty, and it is hoped, a joy forever.

J. R. Shanley, Jersey City, New Jersey, was the contractor.

The maximum grade was reduced from 4.20 per cent. to 2.05 per cent.

The price per contract, lump sum, was \$24,900.00.

The total cost was \$25,970.25.

##### *Matawan and Keyport Road, 1.83 Miles Long.*

This, which was probably the worst, short stretch of turnpike road in Monmouth county, has been so greatly changed and improved that it is scarcely recognizable. The deep hollows, or, more properly speaking, gulleys, have almost entirely disappeared, and, with them, also the hills. The road is of great value to the people of both Matawan and Keyport, and not only to them, but also to the traveling public who are compelled to use this road on their way to and from the seashore. It is built of macadam, sixteen feet wide, six inches thick, finished with gravel wings, eight feet wide and six inches thick.

J. R. Shanley, Jersey City, New Jersey, was the contractor.

The maximum grade was reduced from 8 per cent. to 3.2 per cent.

The price per contract, lump sum, was \$10,000.00.

The total cost was \$20,253.57.

## MORRIS COUNTY.

*Randolph Township Section of Newton Turnpike, 6.07 Miles  
Long, 2.46 Miles of Which Were Completed in 1902,  
.57 of a Mile in 1903, and the Remainder, or 3.04  
Miles, in 1904.*

The road is cut through a wild and mountainous region, and is part of the famous turnpike laid out in the beginning of the last century, with the ambitious design of connecting the head waters of the Delaware river with those of the Atlantic Ocean. For almost one hundred years this turnpike, with its succession of sharp ridges and deep gulleys, remained unchanged, and, consequently, was little used, so the residents of the northern portion of Morris county followed the more circuitous route along the Rockaway valley to the county seat, and, as one of them tersely expressed it, "Morristown is twice as far away from us as it ought to be; if Mount Freedom were only pared down and the tops of the hills cut off and dumped into the hollows, we would not have to travel more than half the distance we now do to reach Morristown."

This seemed to be the universal sentiment, both in Morristown and the northern section of the county. Accordingly, this great undertaking was commenced and carried toward a successful conclusion. The magnitude of the task may be better appreciated when it is known that in many places it was necessary to cut through solid rock to a depth of over twenty-five feet. This is the greatest engineering feat that Morris county has performed since it commenced the work of improving its highways, and the benefits which will be derived from this improvement will not be fully realized for some years to come.

It is constructed of macadam, twelve feet wide and six inches thick.

Milton J. Black, Rockaway, New Jersey, was the contractor.

The maximum grade was reduced from 18 per cent. to 6.50 per cent.

The price per square yard for macadam, native rock, was 36 cents.

The total cost was \$32,855.57.





**Stafford Township, Main Shore Road, Ocean County  
During Improvement**



**Stafford Township, Main Shore Road, Ocean County  
After Improvement**

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*Lincoln Park, Montville and Boonton Road, 4.28 Miles Long,  
1.34 Miles of Which Were Completed Last Year,  
and the Remainder, or 2.94 Miles,  
Completed This Year.*

This road begins at the Beavertown inclined plane and follows the line of the Morris canal to the Boonton township line. It is built of macadam, twelve feet wide and six inches thick. For fuller description see 1903 report.

William J. and Arthur G. Bunn, Paterson, New Jersey, were the contractors.

The maximum grade was reduced from 9 per cent to 6 per cent.

The price per contract, lump sum, second section, was \$10,334.85.

The total cost was \$28,075.67.

#### OCEAN COUNTY.

*Eagleswood Main Shore Road, 3.05 Miles Long.*

The grading and graveling of this section began at the east line of Little Egg Harbor township, where last year's work ended, and was carried forward through Eagleswood township to the west line of Stafford township. The width of the gravel bed is sixteen feet and its depth nine inches.

John W. Horner and George W. Mott, Tuckerton, New Jersey, were the contractors.

The maximum grade was reduced from 4.70 per cent. to 1.60 per cent.

The price per contract, lump sum, was \$7,228.10.

The total cost was \$8,804.10.

*Stafford Township Road, First Section, 2.31 Miles Long.*

This road begins at the east line of Eagleswood township, and extends to Stafford avenue in Manahawkin. It is a portion of the Main Shore road, the lower end of which was improved

last year. It is built of gravel, sixteen feet wide and nine inches thick.

J. Lewis Lane, Tuckerton, New Jersey, and Aaron M. Mathis, New Gretna, New Jersey, were the contractors.

The maximum grade was reduced from 3 per cent. to 1.4 per cent.

The price per contract, lump sum, was \$5,326.60.

The total cost was \$5,886.93.

*Union Township Shore Road, 3.25 Miles Long.*

This continues the improvement from the Stafford township line northwardly to the Ocean township line. The road is built of gravel, sixteen feet wide, six to nine inches thick.

Daniel D. Cramer, New Gretna, New Jersey, and Elmer King, Parkertown, New Jersey, were the contractors.

The maximum grade was reduced from 2.9 per cent. to 1 per cent.

The price per contract, lump sum, was \$11,173.52.

The total cost was \$11,732.20.

*Ocean Township Shore Road, 3.22 Miles Long.*

This is a still further continuation of the improvement of the Main Shore road through Ocean county. It begins at the end of the gravel in Union township and extends northwardly through Ocean township to the Lacey township line. It is built of gravel, sixteen feet wide and from six to nine inches deep.

Aaron M. Mathis, New Gretna, New Jersey, and J. Lewis Lane, Tuckerton, New Jersey, were the contractors.

The maximum grade was reduced from 4.2 per cent. to 1.4 per cent.

The price per contract, lump sum, was \$11,890.59.

The total cost was \$13,151.02.

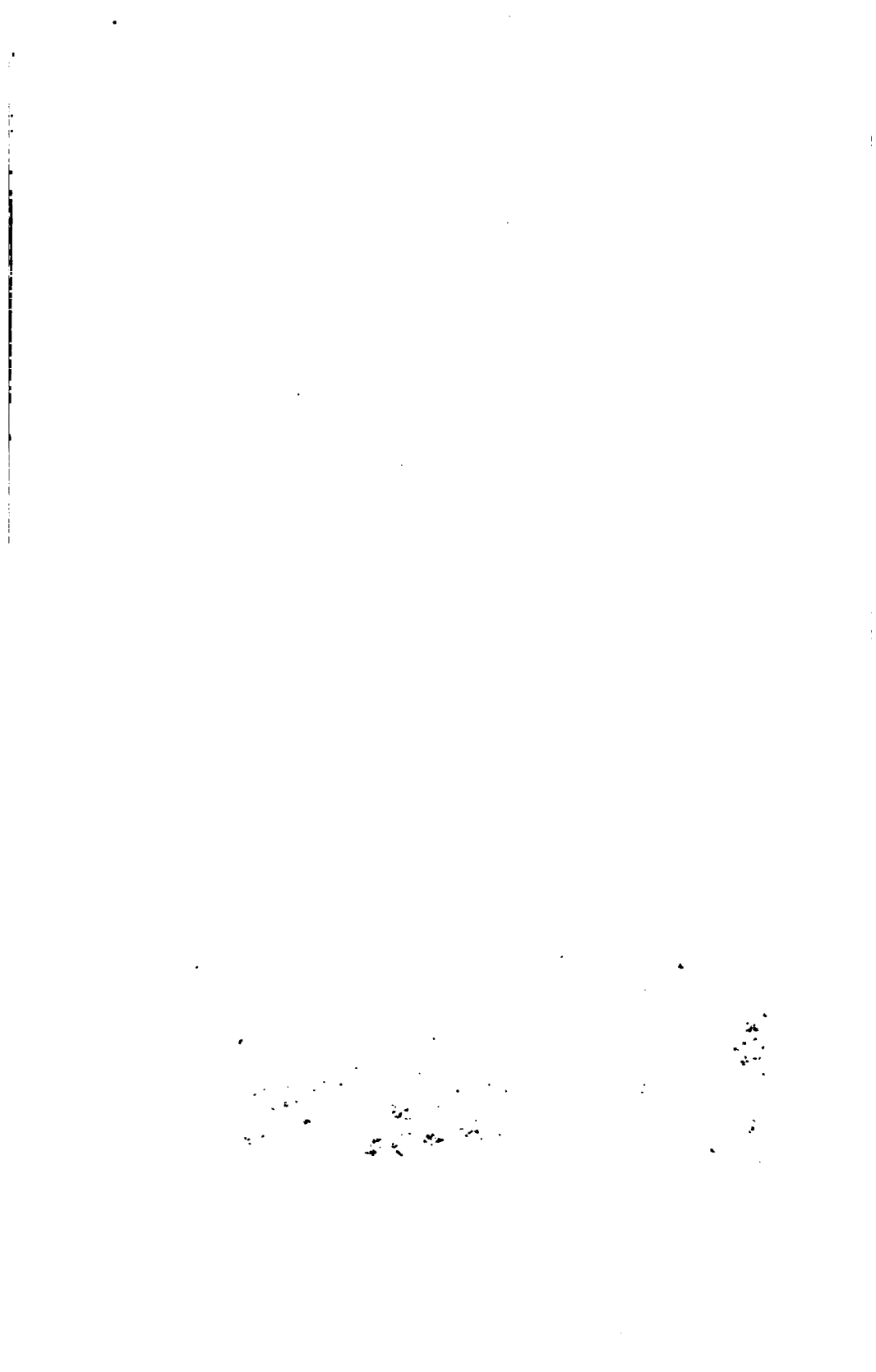
These five sections comprise the portion of the Ocean county Main Shore road improved this year, thus carrying forward Ocean county's through line 14.49 miles further north. With the work done last year, we now have in Ocean county 19.89 miles of good, hard road on the main thoroughfare from Lakewood to Atlantic City.



Union Township Road, Ocean County, 1904  
Before Improvement



Union Township Road, Ocean County, 1904  
After Improvement







**Oyster Creek Branch Road, Ocean County  
Before Improvement**



**Oyster Creek Branch Road, Ocean County  
After Improvement**

This county, though among the last to adopt road improvement under the State Aid Law, has set a very good example to the older road building counties, in that it has confined its operations to one continuous, through line, from the most southerly portion of the county northwardly toward the county seat. The wisdom of this action is already evidenced by the greatly increased travel over this road, bringing, as it does, many people from our own and neighboring states into this seashore region.

Ocean county is especially blessed in possessing a very superior quality of gravel, so superior in fact that the roads made with it have evoked the highest words of commendation from prominent road builders in other states; thus this county is gaining a widespread reputation for good highways which cannot but redound to its benefit.

#### PASSAIC COUNTY.

##### *Squirrel Wood's Road, .60 of a Mile Long.*

This macadam road, sixteen feet wide and four inches thick, begins at West Thirtieth street, and, after crossing the Morris canal, sweeps round in a gradual curve, between the reservoir and the hill, to the macadam pavement on New street, Little Falls township. It serves a double purpose, in that it furnishes an outlet in all kinds of weather for the people who live along its line, and forms a connecting link between two improved roads, over which the residents of Paterson drive in search of fresh air and cool breezes after the labors of the day are ended.

William A. Ferguson, Paterson, New Jersey, was the contractor.

The maximum grade was reduced from 13 per cent. to 4.69 per cent.

The price per contract, lump sum, was \$9,572.50.

The total cost was \$6,343.08.

##### *Barbour Street, .44 of a Mile Long.*

This street begins at Rip Van Winkle avenue and follows the base of the mountain until it reaches the junction of the Cedar Cliff road, Katz and Hamburg avenues. It is constructed of macadam, sixteen feet wide and four inches thick.

This road is built over a very wet and swampy piece of land, and has converted what was almost an impassable wagon road into a smooth, hard highway. It serves the further purpose of connecting two of the main roads leading westerly from Paterson, thus, as it were, doubling the value of the through lines, as well as furnishing the inhabitants of West Paterson with a good and convenient highway between its northern and southern sections.

James S. Sowerbutt, Paterson, New Jersey, was the contractor.

The maximum grade was reduced from 8.4 per cent. to 4.04 per cent.

The price per contract, lump sum, was \$2,622.50.

The total cost was \$3,432.17.

#### *East Thirtieth Street, .50 Miles Long.*

The paving of this street begins at Twelfth avenue and extends across to Seventeenth avenue. It is of macadam, twenty-eight feet wide and four inches thick. The particular value of this work lies in the fact that it connects the two lines of improved streets extending eastwardly from the business center of Paterson toward the Park. This street is located in the suburbs of Paterson, in a section which is rapidly being improved.

McKiernan and Bergin, Paterson, New Jersey, were the contractors.

The grade, except at the extreme northern end, was practically unchanged.

The price per contract, lump sum, was \$3,010.00.

The total cost was \$2,845.86.

#### SALEM COUNTY.

#### *Salem and Pennsville Road, 5.87 Miles Long.*

This road, which is built of oyster shells, extends from Salem, the county seat, to Pennsville on the Delaware river. It varies in width from ten to seventeen feet and in thickness from eight to twelve inches. One portion of this road, namely, that over the bank meadows, is peculiarly suited to this kind of road covering, because it dries so quickly after being covered by an exceptionally high tide. The other,





**Salem and Pennsville Road, Salem County  
Before Improvement**



**Salem and Pennsville Road, Salem County  
After Improvement**



or upland portion, might have been graveled, but the accessibility of the oyster shells seemed to indicate their use for the entire length of the road.

The region traversed by this road is famous for the quantity and quality of the truck produced thereon. Tomato growing especially, is a business in which everyone is interested, either directly or indirectly, and the lines of wagons hauling baskets of ripe fruit to the Salem canneries form one of the most striking sights of this region. As Salem is the county seat, as well as the market town of this section, the vehicles seen on this road form a very pleasing variety. The teams laden with grain, hay and tomatoes are interspersed at frequent intervals with lighter vehicles of almost every conceivable type. The road, therefore, may truly be called a county thoroughfare. In addition to its local value and importance, it possesses another more far reaching, in that it forms a portion of a through line, which is gradually being carried down the shore of the Delaware from Paulsboro through Bridgeport, Pedricktown and Penns Grove. When the missing link from the latter place to Pennsville is constructed, we shall then have a continuous line from Camden through Salem to Hancock's Corner. This will eventually be extended along the Delaware river to the extreme southern portion of the State.

Lorinda E. Tuft and Furman H. Lloyd, Salem, New Jersey, were the contractors.

The maximum grade was reduced from 5.40 per cent. to 1.17 per cent.

The price per contract, lump sum, was \$14,025.46.

The total cost was \$35,470.73.

*Main Street and a Portion of Mullica Hill Turnpike, 1.607  
Miles Long.*

This, the main street of the borough of Woodstown, has been improved from the iron bridge over the pond to the borough line. The construction is a decided innovation in our method of road improvement, inasmuch as 1.14 miles of its length has been paved to a width of twenty-four feet with bitulithic, which is a pavement composed of hot tar and hot stone.

From present appearances, it is one of the most substantial roads that has been built in South Jersey. It is so tenacious

that, where it has been found necessary to dig through it, the picks have often been broken in the attempt. The only apparent objection to it is its cost, which is several times more than that of a pure macadam road. It is a great acquisition to the thriving borough of Woodstown, and the inhabitants are certainly very fortunate in obtaining this road. The remaining portion, beyond the center of the town, a little less than one-half of a mile in length, was finished with gravel, fourteen feet wide and eight to ten inches thick.

The contractor for bithulithic pavement was the Standard Bithulithic Company, of Salem, New Jersey; for gravel, F. H. Lloyd, Salem, New Jersey.

The maximum grade was reduced from 3.00 per cent. to 1.80 per cent.

The price per contract for bithulithic was \$36,258.75.

The price per contract for gravel was \$1,239.19.

The total cost of bithulithic was \$36,258.75.

The total cost of gravel was \$1,309.19.

#### SOMERSET COUNTY.

##### *Inter County Road, 1.27 Miles Long.*

This, the main street of Kingston, begins on the hill in front of the cemetery, and extends eastwardly toward Franklin Park. It is built of macadam, twelve feet wide and eight inches thick.

This work marks the beginning of an improvement which has long been desired, not only by the people in the immediate vicinity, but also by all those who have occasion to travel in private conveyance across our State from Jersey City to Trenton. It is part of the old stage road that passes through so many places of historical interest.

Moran and Sutton, New Brunswick, New Jersey, were the contractors.

The maximum grade was reduced from 8.50 per cent. to 4.00 per cent.

The price per contract, lump sum, was \$7,446.92.

The total cost was \$8,416.21.

##### *Peapack Road, 4.20 Miles Long.*

Beginning at the stone road near Far Hills station, this road follows the course of the north branch of the Raritan river for a



Peapack Road, Somerset County  
During Construction



Peapack Road, Somerset County  
After Construction











of that section an outlet to the county seat. It is built of macadam, fourteen feet wide and eight inches thick.

John McNabb, Bound Brook, New Jersey, was the contractor.

The maximum grade was reduced from 9.00 per cent. to 7.50 per cent.

The price per contract, lump sum, was \$7,435.00.

The total cost was \$8,850.01.

*Davidson's Bridge Road, 3.20 Miles Long.*

This road begins at Davidson's Corner near Bernardsville, and extends through Baskingridge and the Passaic Valley to Davidson's bridge over the Passaic river at Millington, where it connects with the stone roads leading to Newark and Elizabeth.

The completion of this work connects the most northerly portion of Somerset county with the stone road systems of Union and Essex counties, hence it may be truly said that this road is of far greater and more general benefit to the traveling public than any built in Somerset county this year. It brings that famous old Revolutionary town of Baskingridge once more into touch with the active and stirring scenes of to-day. It is built of telford, twelve and fourteen feet wide, ten inches thick, and of macadam, twelve and fourteen feet wide, eight inches thick.

Augustus Munson and Company, Rockaway, New Jersey, were the contractors.

The maximum grade was reduced from 10.00 per cent. to 7.25 per cent.

The price per contract, lump sum, was \$17,753.43.

The total cost was \$18,030.20.

SUSSEX COUNTY.

*Tuttle's Corner Road, 1.695 Miles Long.*

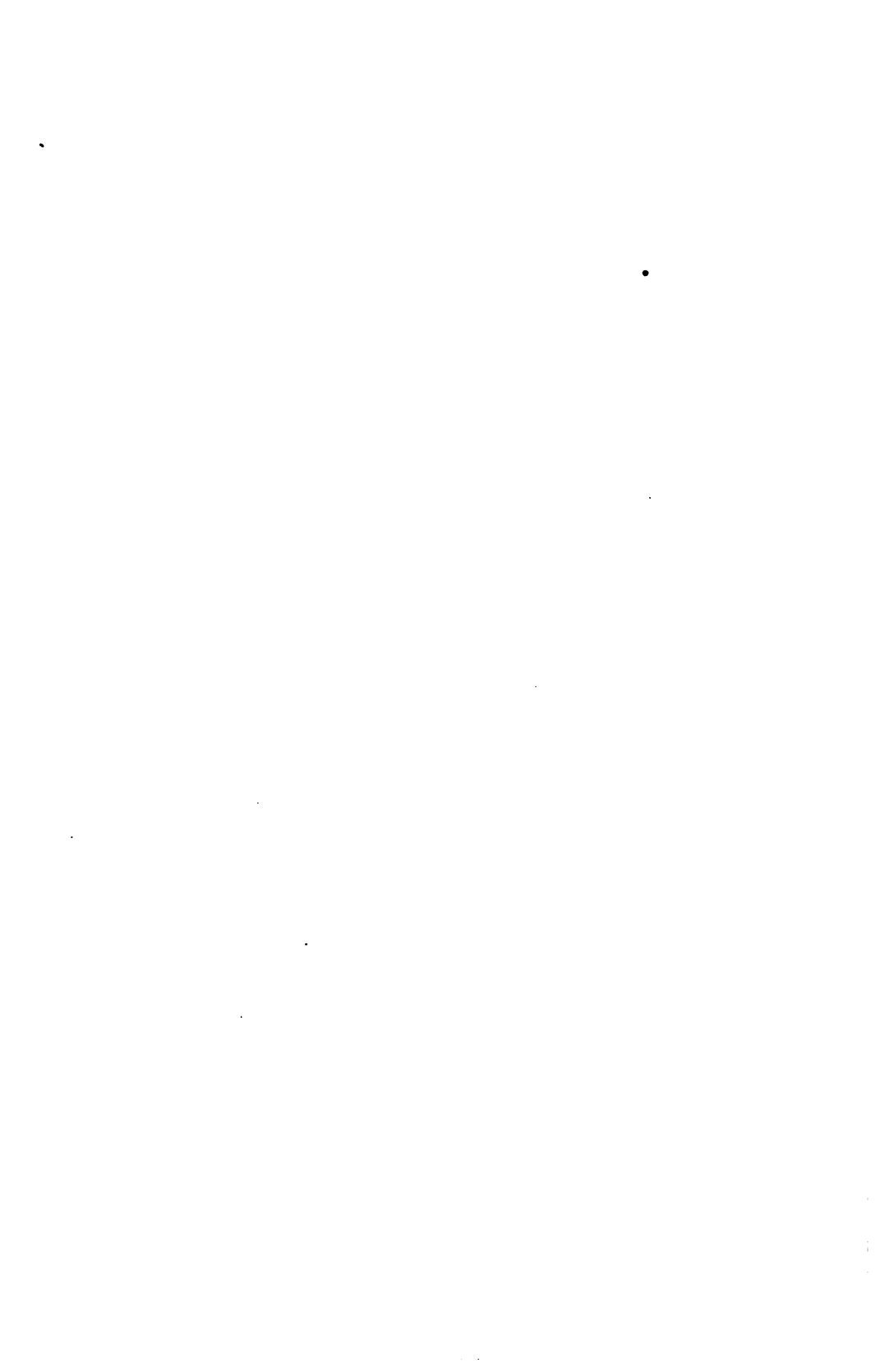
This road begins at Tuttle's Corner and extends toward Branchville. It is built of telford, fourteen feet wide and fifteen inches thick.



**Mountain Avenue, Bound Brook, Somerset County  
Before Improvement**



**Mountain Avenue, Bound Brook, Somerset County  
After Improvement**





William H. Weldon, Rahway, New Jersey, was the contractor. The maximum grade was reduced from 4.50 per cent. to 4.15 per cent.

The price per contract, lump sum, was \$2,816.21.

The total cost was \$3,347.37.

#### WARREN COUNTY.

##### *Danville Road, Second Section, 3.67 Miles Long.*

This road is built of macadam, twelve and sixteen feet wide and six inches thick. For description see 1903 report.

Salmon Brothers, Hackettstown, New Jersey, were the contractors.

The maximum grade was reduced from 15.50 per cent. to 6.66 per cent.

The price per contract, lump sum, was \$15,995.76.

The total cost was \$17,731.72.

##### *Stewartsville Road, Second Section, 2.44 Miles Long.*

This road is constructed of macadam, twelve and sixteen feet wide and six inches thick. For detailed description see 1903 report.

Salmon Brothers, Hackettstown, New Jersey, were the contractors.

The maximum grade was reduced from 10.00 per cent. to 6.2 per cent.

The price per contract, lump sum, was \$13,484.18.

The total cost was \$14,395.11.

##### *Morris Turnpike, 2.59 Miles Long.*

The finishing of this work marks the completion of the macadamizing of the old Morris turnpike from Washington to Phillipsburg. If nothing more had been done to this road than to reduce the gradients to their present state, it would have been a vast improvement, and, with the addition of a macadamized surface, fourteen feet wide and six inches deep, the old road is hardly recognizable. The former surface was rough, rocky,



**Independence Township, Warren County Road or Danville Road, Half mile East of Danville, Before Improvement**



**Independence Township, Warren County Road or Danville Road, Half mile East of Danville, During Improvement**









**Slipman's Hill, looking westward, Morris Turnpike, Lopatcong Township  
Warren County, Before Improvement**



**Slipman's Hill, looking westward, Morris Turnpike, Lopatcong Township  
Warren County, After Improvement**

rutty, hilly and utterly disreputable. In the spring the traveler, in driving over this road, deemed himself fortunate if his axle did not occasionally touch the ground. The hills were so steep that an empty wagon was about all one horse could haul up the hill. Now, all this is changed. The grades have been reduced more than one-half. The maximum grade before was 12.4 per cent.; it is now 6 per cent. All that remains to perfect this work is that the borough of Phillipsburg should complete the portion within her borders still unimproved.

Jerre B. and Herbert K. Salmon, Hackettstown, New Jersey, were the contractors.

The price per contract, lump sum, was \$22,683.15.

The total cost was \$25,134.25.

*Roxburgh Road, 3.01 Miles Long.*

This road begins at the town line of Belvidere and extends in a generally southerly direction to the Oxford township line at Roxburgh. It is a portion of the main road from Belvidere to Phillipsburg. Its condition during the winter and spring was such as to render it almost impassable; consequently, the farmers on the river bottoms below Belvidere were subjected to great loss and inconvenience, owing to their inability to haul their grain to the mills at Belvidere.

By the grading, relocating and macadamizing of this road with a pavement twelve feet wide and twelve inches thick along its center, the former conditions existing along this road are entirely changed. In place of ruts, mud holes, rolling stones and boulders, we have a smooth, hard, well graded and properly sloped road, running in a comparatively direct line from one extremity to the other. The changes of location have done more to improve this road and lift it out of the mire than even the grading.

It is hoped in the near future that this improvement will be extended through to Phillipsburg, thus giving the inhabitants of New Jersey a good line along the Delaware, without being compelled to cross and re-cross the river into the State of Pennsylvania, in order to reach their point of destination in our own State.

The Delaware River Quarry and Construction Company, Jersey City, New Jersey, was the contractor.

The maximum grade was reduced from 10.00 per cent. to 5.30 per cent.

The price per contract, lump sum, was \$16,994.60.

The total cost was \$21,721.98.

*New Brunswick Turnpike, 1.38 Miles Long.*

This road begins at the Straw Church road, near the terminus of the trolley line from Phillipsburg, and extends to Still Valley. It is built of macadam, fourteen feet wide and six inches thick.

This is a portion of the turnpike from New Brunswick to Easton, which was laid out over three-quarters of a century ago, and, until the advent of the railroad, was one of the busiest thoroughfares in western New Jersey. Its principal use at present is that of furnishing a good and convenient highway for the farmers and dairymen to the great market of that section, Easton.

One notable change was made in the location of this road, namely, of that section which followed what was in wet weather the bed of a brook. Here it was carried along for quite a distance on the higher land until it again met the old line. This change of location has in itself greatly enhanced the usefulness of the road.

Salmon Brothers, Hackettstown, New Jersey, were the contractors.

The maximum grade was reduced from 6.2 per cent. to 4.6 per cent.

The price per contract, lump sum, was \$10,818.86.

The total cost was \$11,409.56.



**Roxburg Road, Warren County, Showing New Line  
Before Improvement.**



**Roxburg Road, Warren County, Showing New Line  
After Improvement.**



## Road Improvement in New Jersey for the Year 1904.

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The intense desire on the part of the different counties for road improvement, stimulated by the belief that the Legislature would increase the appropriation, incited our people to petition for many more miles of roads than the funds available would permit us to grant. Consequently, we were compelled to refuse our approval of many specifications for new work, until that already under way was finished and paid for. When this was done, there was very little left. As a result, many of the most enterprising counties show a decreased mileage, and the aggregate number of miles built is 107.717, forty-five less than that of last year.

The following is a condensed account of the progress of the work in the different counties of the State this year:

Atlantic county commenced no new work, but finished the grading of the second section of the meadow boulevard between Atlantic City and Pleasantville. Tracks for transporting gravel have been laid from the road to a fine gravel bed two miles distant. The metalling of the surface with this material will be completed early in 1905. When finished, Atlantic City, Pleasantville and the surrounding farming country will have one of the most complete and useful meadow roads in the State.

The freeholders of Bergen county are making no road improvements either under the County or State Aid Law, but the townships have macadamized many miles unaided. Now, with the assistance of the State's aid, they are building many more roads connecting with those already improved, thus making several through lines to the State boundary. This year's work includes Ridgewood avenue, 1.68 miles; Teaneck road, Ridgefield avenue, Hackensack road, Mt. Vernon street, Paulison avenue, Sixth street, Central and Railroad avenues, 3.62 miles; Summit, Westwood and West Hillsdale avenues, .885 miles, and Fair-

view, Hillside, Washington, Lafayette and Fourth avenues, in the borough of Westwood, 3.19 miles, a total of 9.375 miles. Midland avenue is fast approaching completion, but was not finished in time to claim a portion of the state aid this year. When it is completed, 2.22 miles more will be added to the improved roads of Bergen county.

Burlington county constructed 28 miles of road last year, and this year built only 2.48 miles, as follows: namely, second section Vincentown and Red Lion road, 1.89 miles, and the extension of the Crosswicks road into the business center of Bordentown, a distance of .59 of a mile. On account of heavy outlays for roads during all these years of State aid, resulting in the construction of over 170 miles, the freeholders exceeded their appropriations; and, being unwilling to bond the county for road improvement, decided to wait one year, or until the income from ratables caught up with the expenditures.

Camden county is now pursuing the policy of buying each year, through state aid, the toll roads within its boundaries. Last year the county acquired the Blackwood pike, 7.39 miles, and this year the Westfield and Camden turnpike, 5.98 miles. These turnpikes give easy access on macadamized roads through rich farming and trucking districts to the Camden and Philadelphia markets. The new work in Camden county this year was confined to the Clementon road, 1.40 miles long, which is not yet completed.

Cape May county confined her expenditures to the improvement of the Ocean City turnpike, 2.23 miles long, across the meadows from Ocean City to the mainland. This road is of novel construction. It was built of poles, laid lengthwise and crosswise; these in turn were covered with a heavy bed of oyster shells, and the latter with gravel, the whole protected by ditches and mud banks on each side. The construction seems well calculated to resist the tides that occasionally flow over it.

Cumberland county gave the finishing touches to the Maurice-town road, 1.22 miles long, made necessary by the sinking of the embankment after completion, thus increasing the cost of the road nearly one-half. This county has many roads that the people wish to have improved, but the unforeseen cost of this first road has for a time checked their ardor.

Essex county finished the Hobart's Gap road, 3.88 miles, and the Swamp road, 4.66 miles, a total of 8.54 miles.

Gloucester county, having been in past years a liberal road



builder, is resting and recruiting its funds for renewed effort in the future.

Hudson county is still working with the Belleville turnpike, 2.32 miles long. The work was much delayed by the failure of the contractor, the refusal of the Erie railroad to allow the dirt trains to cross their road at grade, and the settling of the fill. From present indications the road will be finished and ready for travel before next summer.

The commissioners of Hunterdon county, being unwilling to improve the roads petitioned for, were mandamusd by the courts, with the result that they are now preparing specifications for the improvement of the road from Lambertville to Ringoes, a distance of 6 miles.

Mercer, one of the most enthusiastic good roads counties in the State, is still anxious to extend its system, and is prepared to build all that the State will approve of. This year the county finished the following roads, commenced last year: Princeton Hill, 70 miles; Scotch, 1.95 miles; Harbourton, 1.70 miles; and built one new road, Mercerville and Lawrence station, 3.20 miles, making a total of 7.55 miles.

Middlesex county, besides completing the Landing Bridge and New Market road, 1.50 miles, Bridge Approach, Ridgeway avenue and Fourth street, 1.25 miles, Extension of Sayreville road, 2.53 miles, and the Morristown and Lawrence Harbor road, 1.98 miles, has constructed the Jamesburg Reform School road, .96 miles, the first section of the Woodridge and Oak Tree road, 2.30 miles, and, in connection with Somerset county, has road, 2.30 miles, and, in connection with Somerset county, has improved the Franklin Park and Inter County roads, paying for one-half of them, or 1.90 miles, a total of 12.42 miles. In addition to the foregoing, the work on the South Amboy and Keyport road, 1 mile, is being rapidly pushed toward completion.

Monmouth county built the second section of the Manalapan and Freehold road, 3.38 miles, and the Matawan and Keyport road, 1.83 miles. In addition to these the Oceanic and Sea Bright road, 1.50 miles, is being pushed rapidly forward, while the remaining portion of Corliss avenue has a few short stretches of gravel yet to be laid.

Morris county completed the Randolph township section of the Newtown turnpike, 3.04 miles, also the second section of the Lincoln Park, Montville and Boonton road, 2.94 miles, making a total of 5.98 miles.

Ocean has been the most ambitious county in the State this year, having commenced and completed the first section of the Stafford township road, 2.31 miles, Eagleswood Main Shore road, 3.05 miles, Ocean Township Shore road, 3.22 miles, Union Township Shore road, 3.25 miles, a total of 11.83 miles, while the second section of Stafford township road, 2.66 miles, will be completed in a very short time. These roads are all of a good quality of gravel and twenty-four feet wide.

Passaic county completed the Squirrel Wood's road, 60 miles, Barbour street, .44 miles, and East Thirtieth street, .50 miles, a total of 1.54 miles. East Twenty-seventh street, .44 miles, and Mountain View and Signac road, 2.47 miles, are being rapidly pushed to completion, while the Paterson and Hamburg turnpike will probably be finished next spring.

Salem county constructed the Salem and Pennsville road, 5.87 miles, and Main street and a portion of Mullica Hill turnpike, 1.61 miles, a total of 7.48 miles. This county has built a greater variety of roads than any other. The Salem and Pennsville is of oyster shells; Main street, Woodstown, is of bithulithic or tar macadam, and a portion of Mullica Hill turnpike of gravel.

Somerset county, in connection with Middlesex, commenced the improvement of the Franklin Park road. The first section, or 2.53 miles, was completed; also the Kingston end, known as the Inter County road, 1.27 miles. One-half of these, or 1.90 miles, is Somerset county's share of the work. In addition to these, it built the Far Hills and Peapack road, 4.20 miles, Blazier's Corner and Davidson's Bridge road, 3.20 miles, and Mountain avenue extension, Bound Brook, 1.38 miles, a total of 10.68 miles.

Sussex county completed the Tuttle's Corner road, 1.69 miles. The decision of the court in the Franklin Furnace assessment matter left the county without funds; consequently, several roads for which specifications were prepared, had to remain unimproved. The borough of Sussex, however, commenced the improvement of several of its streets which form portions of the leading through thoroughfares of the county.

Union, as a county, has done nothing, but the borough of Cranford improved Centennial avenue, .63 miles long.

Warren county has fully entered the list of road builders, completing the remaining portion of the Danville road, 3.67 miles, the Stewartsville road, 2.44 miles, Morris turnpike, 2.59 miles,

Roxburgh road, 3.01 miles, and the New Brunswick turnpike, 1.38 miles, a total of 13.09 miles.

#### AN APPEAL FOR INCREASED APPROPRIATIONS FOR ROADS.

The wealth and population of New Jersey is each year moving upward with giant strides. The surplus is large and increasing, and the demand from all classes for improved roads is so great that the Legislature could perform no more popular and beneficent act than to appropriate from it double the amount at present apportioned for roads.

The State Act, which has encouraged the improvement of hundreds of miles of roads, and given New Jersey a world wide reputation, has done more to advertise the State, and thus attract wealth and population, than any measure placed upon the statute books during the two hundred and forty years of its existence as a Colony and a State.

According to the annual report of the State Board of Taxation, our ratables amount to \$1,055,379,023. Of this amount \$912,182,594 represents real estate, and \$153,244,987 personal property. The increase in value was, in 1903, \$55,502,072.70, in 1904, \$47,186,881. These figures are exclusive of the valuation of railroad and canal properties. The above figures do not represent all of the increase, because the valuations of property for the purpose of taxation are never more than two-thirds of the actual; and, in addition to this, much escapes being rated.

New Jersey has added to its population more rapidly, during the last three census periods, than any State east of the Mississippi. The increase between 1890 and 1900 was, in round numbers, 439,000, or over thirty per cent., thus outstripping most of the hustling western States. Our population is now over two millions and is rapidly increasing. Much of this increase in wealth and population is credited to its thousands of miles of hardened roadbeds. Many persons, attracted by our improved highways and the pleasure of traveling over them in automobiles and other vehicles, are transformed from visitors into home seekers and buyers, thus adding to our wealth and population. Is it not, therefore, the part of wisdom for our solons to devote much of the overflowing surplus of our treasury to still further extend the good roads which have already attracted so many desirable residents to our State?

New Jersey cannot afford to go backward. One of the distinctive features of New Jersey's policy is road improvement. The

fact must be borne in mind that our State possesses to-day more miles of macadamized roads than any three States in the Union, and these, with the use the automobile, open up properties five and ten miles from the railroad stations, thus towns and neighborhoods outside of the great cities are being rapidly built up with a useful, intelligent and tax paying class of inhabitants.

The unprecedented majorities given our late candidates for Governor and Legislators show an emphatic endorsement of their past action in devoting such liberal sums to roads and schools. With such an array of constantly increasing wealth and population, with such a grand endorsement by the popular vote, is it not the best policy and the perfection of wisdom to still further move the surplus in the directions that have added so much to our greatness as a State?

#### NECESSITY OF LEGISLATION FOR WIDE TIRES.

We now have over two thousand miles of improved roads in New Jersey, the cost of which has been over ten millions of dollars. Fully one million dollars more are being spent annually in increasing this mileage and in repairing those already built; therefore, the necessity is at once apparent that, on the score of economy alone, the State should do all that lies in its power to preserve that which it has so generously contributed to the building of, and this can be done only by compulsory legislation or by a system of awards, or by a combination of both. A law, compelling the use of wide tires, should, as quickly as possible, be placed upon our statute books. Ordinary observation reveals the fact that heavily laden wagons, with sharp, rounded, narrow tires, are taking thousands of dollars each year from the life of our roads, and other thousands from the pockets of the users, because of the lessened loads that they are able to haul on these narrow tires in comparison with those on the broad ones.

Foreign countries and several of our States have made thorough tests, which have demonstrated in all cases that wide tires are road improvers and money savers. The Experiment Station of Missouri made tests on a variety of soils,—meadows, pastures, stubble and plowed ground,—of all classes of roads, and found the conditions were from seventeen to one hundred and twenty per cent. in favor of wide tires. In Utah, the dynamometer test showed 12.7 per cent. in favor of three-

inch tires. The Ohio test demonstrated that with a three-inch tire the draft on a load of 4,480 pounds was one-half less than that of a narrow tire. In each experiment in all the States it was found that the broad tires rolled and levelled the road, while the narrow tires cut them into ruts.

This subject has received close and careful attention in Europe. In Austria, all wagons built to carry more than two and one-quarter tons, must have tires at least four and one-third inches wide, and, if built for more than four and one-half tons, the rims must be at least six and one-quarter inches broad. In France every freight and market wagon is a road maker. The tires are usually from four to six inches in width, and the rear axle is about fourteen inches longer than the front, thus about twelve inches in width is rolled each time the wagon passes over the road. In Germany all wagons drawing heavy loads must have tires at least four inches wide. European countries have long ago discarded narrow tires, much to the advantage of their roads, horses and vehicles. It is to be hoped that our legislators and farmers will quickly follow their example.

A narrow tired wagon is a road destroyer; a wide tired wagon is a road maker.

#### EARTH ROADS.

When kept in proper order, earth roads are, from six to nine months in the year, as good as could be desired for light travel. In order to preserve their usefulness, the greatest care must be taken to see that drains and culverts are placed wherever needed, and that they are always in good working order. They should be well crowned or rounded up, so as to shed the water freely to the side ditches, but, in making this crown, sod, vegetable mold and worn out dirt should be carefully excluded. A great deal of injury is done to earth roads by running a grading machine along the edges, thus bringing these objectionable materials to the center. They should be thrown outward, across the open drain, or carted away. Underdrains should be liberally used where the water does not leave the side of the road early in the spring, or wherever the ground appears to be continually damp. Earth roads can be materially improved for summer travel by passing a grader or planer lightly over them early in the spring,

before the ground has become hard and baked by the sun. It is much more satisfactory to make a good road by the use of machinery than to wear it down by travel. If a grader is not available for this work, a second hand railroad rail, weighing from fifty to seventy pounds per yard, may be dragged up one side of the road and down the other with excellent effect. A steel I-beam is equally as good. The object of this treatment is to smooth down the ridges and fill the ruts and hollows. The blade of the grader or the rail should be kept nearly square across the road, so as to carry a sufficient amount of earth before it to fill depressions. It is most important that this work should be done while the ground is slightly moist.

It is not advisable to repair holes in an earth road by filling them with gravel or broken stone. The latter materials do not wear down so rapidly as the earth around them, with the result that they become bumps or ridges, the effect being to make two holes where there was originally only one.

A dirt road nicely crowned and well drained will make an excellent foundation upon which to place a layer of gravel. A driveway, which has passed through an apprenticeship as an earth road, and has, during that time, had due attention given to its drainage requirements, will indicate to the observer the points at which open drains, culverts and underdrains are most needed. When these are provided, gravel can be applied to the best advantage.

Townships that feel compelled to use dirt roads for the present, because of the absence of a local supply of gravel or stone, should not think that the more primitive means of making roads, and the old time system of road management, are suitable for them. If this class of road is to be maintained, there is all the more reason that it should be kept in good repair, and that the most efficient and economical system of doing this should be adopted.





**View of Road Exhibit from Model Street, Bungalow on Left.**







**Closer View Showing Successive Courses of Stone.**

# New Jersey at the Louisiana Purchase Exposition.

BY ROBERT A. MEEKER, STATE SUPERVISOR OF ROADS.

The New Jersey Commission to the Louisiana Purchase Exposition requested our department to make an exhibit of road building at the Louisiana Purchase Exposition, St. Louis, Mo., and made an appropriation of five thousand dollars for that purpose.

Complying with their request, we constructed, on the plot allotted to us, forty feet of macadam, forty feet of telford and forty feet of gravel, one beyond the other from the front to the rear of the plot, while on the left of and at right angles to these, was built the shell road. In these the process of road building was shown in its successive stages. First, the prepared sub-grade, showing the earth carefully shaped and rolled to a grade and curvature parallel to that of the finished road; second, the bottom course; third, the intermediate, and fourth, the finished road. This general description applies to all except the shell road. Here we had no prepared sub-grade. Large poles were laid lengthwise upon the marsh grass. Across these were laid the small poles at right angles to the line of the road, and on the foundation thus prepared the oyster shells were spread. In front of this last section and beside the others, we erected a bungalow, sixteen by thirty-two feet, in which were exhibited photographs of roads, before and after improvement, and a large wall map of the State, on which was indicated our improved roads, and where was also kept a supply of our reports and maps for distribution to those interested in road improvement. In front of the bungalow, on the Model street, we improved a section, one hundred feet in length, by macadamizing the center with New Jersey trap rock, and finishing the sides with New Jersey gravel.

The results attained proved the wisdom of the step, inasmuch as we had, in the early days, many visitors from the middle

west, and later, the representatives of foreign countries. To all of these it was soon evident that our reputation as pioneer road builders, under state regulation, was beyond dispute, and, in further proof of the justice of our claim of being the first road building State in the Union, our exhibit received the highest award,—a gold medal.

We wish to acknowledge our indebtedness to Mr. Stewart Hartshorn, Short Hills, New Jersey, for a donation of 108 tons of most excellent quality trap rock, and to Mr. William G. Moore, Haddonfield, New Jersey, for 113 cubic yards of very fine Buck Hill gravel.

The idea of building the road in sections seemed to strike the right chord in the minds of those interested in road improvement, and led to many inquiries about our methods and the reasons therefor. The interest in road building is very great all through the middle West, because the people are finding it more and more difficult to transport the products of their farms to the market, owing to the number of teams that use the roads. In the early days, when the country was sparsely settled, teams were few and land cheap; consequently, when a road became bad, the driver simply made a new track and left the old road to grow up and become part of the arable land. Now, all this is changed. Crops are large, teams are many and land is valuable. As a consequence, the numerous wagons must keep within the line of the road, and they cause, by their frequent passage, deep ruts, which form a serious impediment, amounting, in many cases, to a stoppage of travel. The farmer, therefore, is cut off from the market, and both he and the merchant suffer in consequence. The loss entailed has become so large and the inconvenience to every one so constant, that the great question is, how shall we improve our roads. To one who could answer this question the people were ready to give careful and earnest attention; thus New Jersey attracted much favorable notice, and all seemed to be convinced that our State was the ideal one in which to live. Some went so far as to say that if they could close out their business interests, they would move to New Jersey.

It was conceded on all sides that though other states might claim supremacy for their farm and dairy products, New Jersey was pre-eminently the good roads State, and as such, the commonwealth of homes.

For these reasons our exhibit was closely examined by many persons, with the idea of using our methods to raise themselves out of the mire. First, the prepared sub-grade attracted their

attention and aroused their curiosity. The idea of forming and consolidating the earth, before applying the road metal, was to many entirely new, as was also that of underdraining where the soil was wet and heavy. That the sub-grade should have the same form and curvature as the finished road, struck many as novel, but when it was shown that this aided materially in the drainage of the road, and also formed the templet for the arch of the road covering, the wisdom of this preparation was readily seen. On the consolidated earth a layer of two and one-half inch stone was spread and consolidated, and, on this in turn, a layer of one and one-half inch stone was placed and carefully rolled and bonded with good gravel after being thoroughly wet, the idea being to make the mass as nearly impervious to water as possible; this was then covered with a layer of three-quarter inch stone and screenings and the whole thoroughly wet and rolled. The result was so satisfactory that many questioned whether such roads could be built in the sparsely settled farming districts, on account of their great cost, and were astonished to learn that the cost was from five to six thousand dollars per mile.

Beyond the macadam road described above we had a telford section, which, owing to the large stones forming its foundation, attracted much attention, but did not seem to appeal very strongly to the public, although its advantage in wet sections was carefully explained to them, while the technical representatives of continental Europe took issue with us strongly on the advisability of using it at all, contending that it is better to use more underdrains.

Our yellow gravel attracted much attention, owing first to its color second, to its binding or packing quality, and third, to its elasticity. The firm, hard, smooth surface, combined with the springiness of this road covering, appealed very strongly to horsemen, many of whom said it formed the finest road surface for speeding over that they had ever seen. A number of men said that as their families expected to spend next summer on the New Jersey coast, they were going to ship their road horses East, in order that they might enjoy driving over such fine, hard, springy roads.

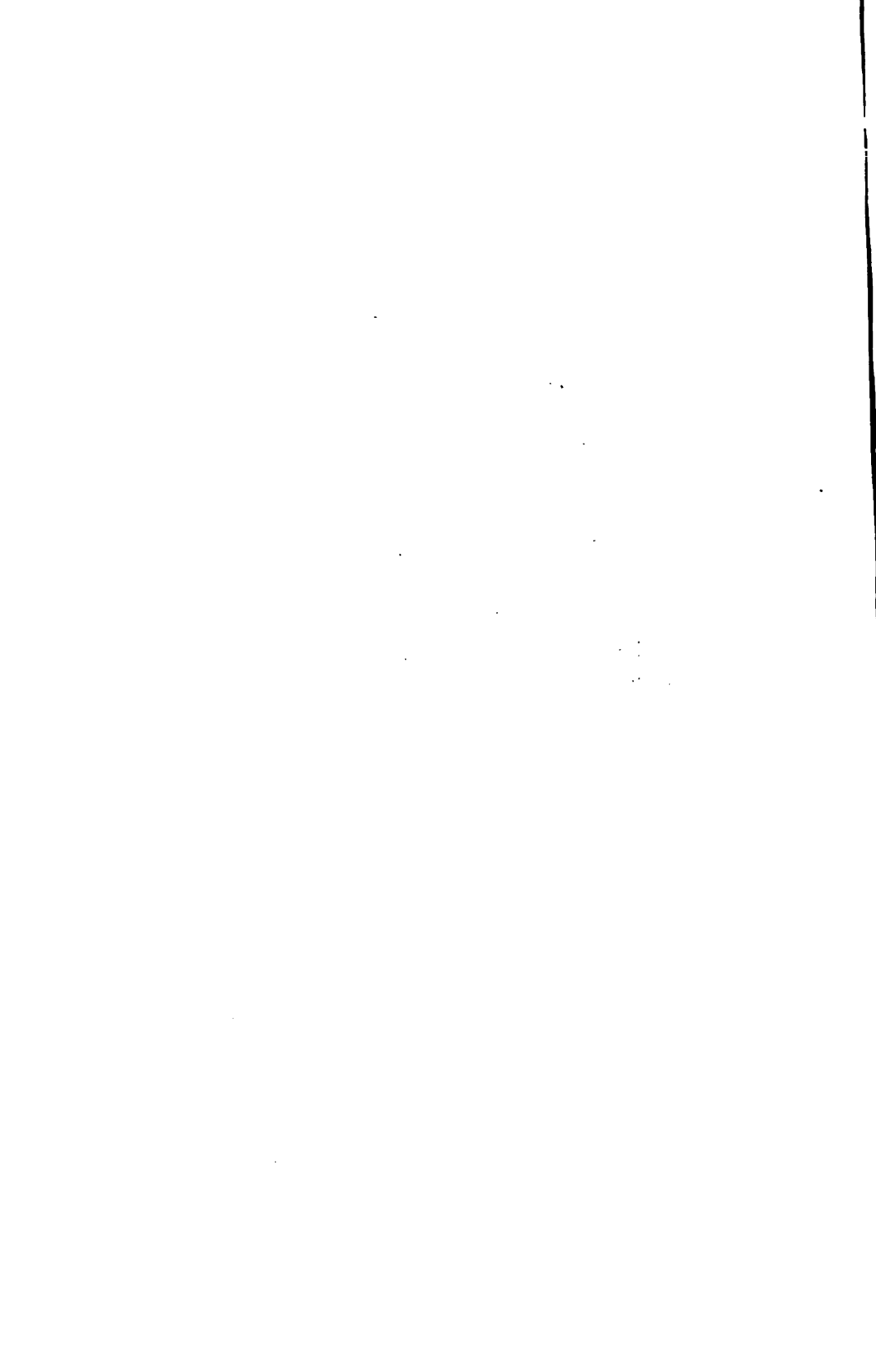
On the left of these three varieties of road covering we had a section of shell road. This was a decided novelty to many of our visitors, and the conditions under which it is used in our State excited their interest to such an extent that many expressed

the intention of visiting New Jersey for the purpose of seeing for themselves the use of oyster shells on an actual public highway.

The results of our exhibit of the methods and extent of New Jersey road improvement have been, first, that many people of means have been attracted to our fine roads, and, through them, to the advantages offered by our State as a place of residence; second, that many representatives of foreign nations have realized for the first time that there is such a State as New Jersey, our proximity to New York having closed their eyes hitherto to the fact, and, with this knowledge, has come the desire to see and know more about us; (The technical representative of one European nation did, in fact, shorten his stay at the St. Louis Exposition, in order that he might have the pleasure and satisfaction of driving over our good roads, and, after viewing them, expressed himself as both surprised and pleased with what he saw); third, that New Jersey's claim of being the first road building State has been firmly established; fourth, that good roads are within the reach of all if they will only make proper use of the means at hand, and last, but not least, that New Jersey is the leader in road improvement in the United States.



**Successive Courses of Telford Construction.**





## Oiled Roads.

Why do we not oil our roads is a question that is frequently asked. To answer this, we insert an able editorial and some extracts from the *Engineering Record*, which so thoroughly explain the conditions that all who read our report will have an answer to their inquiry, and possess the necessary data to experiment in those different counties where the freeholders are seriously considering the propriety of making the application of oil, especially to protect and preserve our nicely formed gravel roads.

For the past year our Department has been gathering information upon the subject, and now believes the process would be, in a large measure, an economical success, if a crude oil, containing over fifty per cent. of asphaltum, could be cheaply obtained; that is, at from fifty cents to one dollar per barrel. The crude oils of Pennsylvania will not answer, as they do not contain this necessary ingredient; consequently, they evaporate quickly and are too costly. These oils have been tried frequently, but with unsatisfactory results. Large asphaltum oil fields are reported to have been discovered in Indiana. If such proves to be a fact, the Eastern states will be able to obtain oil of the proper consistency so cheaply they can give our improved roads a surface that will be proof against wind or water storms. One of the features of highway construction now receiving most attention, in both this country and in Europe, is the use of oil on broken stone and dirt roads. The first extensive use of oil in such work was in California, and the practice has extended rapidly there until at present about three thousand miles of country and city roads have been treated in this way. The results are generally considered satisfactory.

The importance of this method of preventing dust on ordinary roads is growing rapidly with the increasing use of automobiles. These latter stir up the dust on roads in a manner that is unpleasant to those using them and very disagreeable to the people in the vicinity. With the growing use of these vehicles, some inexpensive method of keeping down dust has become necessary,

and the use of oil offers an interesting opportunity for experiment. Outside of California trials of oil have been made extensively, with more or less success. The Scottish Automobile Club is using westrumite and crude oil on two stretches of road, in order to determine their relative merits. There is need of a careful investigation of the subject, in order that the principles governing the use of oil may be definitely determined. The *Engineering Record* is convinced that the use of oil has come to stay, but it is equally confident that there will be many bad blunders made and some very unsatisfactory results reached unless the action of oil is properly understood. It is important to observe that in California, where oiled roads have been most successfully used, there are two unusual local conditions. In the first place, the climate is very dry as a rule, the rainfall being four times less than in this State. In the second place, the oil used on the roads has an asphalt base quite different from that found in the Eastern States.

"Road building in a dry climate is unlike the same work in a moist climate. In a dry climate the problem is not one of drainage, but one of keeping the materials of the road consolidated. There is not enough moisture to cause the binding of the stone and it unravels like macadam roads everywhere in very dry weather. Moreover, in climates like that of Southern California, the great objection to dirt roads, their muddy condition after rains, is not a serious one, because the rains are not sufficiently frequent. A dirt or gravel road is a logical solution of the road problem in such a climate, provided there is some way of keeping the surface hard and compact without using water. The local California oil answers this requirement, and hence the unusual popularity of oiled roads in that State.

In other parts of the country the conditions may be very different. The soil may not be so porous as that of most of the sections where oiling has been done in California, and the drainage problem may be one of some moment in consequence. The rainfall may be great, and torrents may occur at times which sweep the surface of the road with erosive force. Finally, it may be possible to secure only an Eastern oil, containing no asphalt. Under such conditions it may be safely stated that there is no definite information available to-day which will enable an engineer to predict with any chance of certainty whether oiling will be a success or a failure. He is even left in the dark concerning the best method of making an experiment. Conse-

quently, a thorough authoritative study of the problem will be of much value."

The Department of Highways of California has recently issued a bulletin presenting all the available data relative to oiled roads in the State, a few extracts from which here follow:

"The experiences of forty counties, extending from Tehama in the north, to San Diego in the south, a distance of six hundred miles, cover the subject so thoroughly that certain deductions have been drawn which will give a basis of work to those desiring to undertake such improvements.

"In the beginning, oil was used as a substitute for water to lay the dust of roads more cheaply. Its efficiency for this purpose was quickly recognized, and, through the hardened and lasting surface obtained, road makers were led to its use in making permanent road surfacing. In such development what is most needed is strict adherence to certain good road principles, and the close attention and application of the road makers to see that the sub-grade or foundation receives the benefit of such principles. Careful work should be had in the preparation of a road that is to be oiled. If an earth foundation is to be dealt with, it should be worked until a uniform density is obtained. In the case of macadam or graveled roads, they should be smooth and free from weak or wornout spots.

"In the application of the oil to any surface, no pains should be spared to get an equal distribution, and a liberal sanding to hold the oil in place on the crowned surface. The sand not only retains the oil in position, but is incorporated with and thus gives the real body to the contained asphaltum. The bearing power of the surface is greatly enhanced by the proper saturation of sand with the oil.

"Alameda County—The oiling of roads began in 1902, and there are now about 150 miles and 10 miles of city streets. The soil is mostly gravelly, some sandy loam, and some adobe and clay. On clay soil the road was first plowed and crowned, and oil applied at the rate of 400 barrels to the mile, for a strip of 12 feet wide, then rolled.

"Los Angeles County—The first oiling of roads was done in 1898, and there are now 383 miles in use, and 130 miles of oiled streets. A large variety of soils is encountered throughout the county. In general practice the roadbed is first carefully graded, given a proper crown for permanent drainage, and then packed by travel or rolling. In some cases the packed road surface is covered with one or two inches of screened sand, and the oil

and sand thoroughly mixed. In other cases oil is applied directly to the surface and then covered with a light coating of sand. The sand applied in either way prevents the wheels from picking up the oily surface. In other cases, where the road is dusty, the oil is simply incorporated with the dust; in still other cases, the surface of the road is harrowed and loosened before applying the oil. Good roads result from each method, depending upon the different conditions and kinds of soil.

"The DeCamp oiler, Glover oiler, and sprinkling-carts, with a modified Studebaker spray, have been used in applying the oil. The oil is incorporated with the soil or sand by means of harrows, the White mixer, or the mixer of the DeCamp machine. The Fitzgerald tamping roller has been used very successfully on private work in Los Angeles county, but has not been used by the county officials. In the care and maintenance of the public roads a variety of smoothers are used, besides hand tools for the repair of chuck-holes. On ordinary country roads the oiled part is twelve feet wide, and in some cases, in the vicinity of cities, eighteen feet wide. From 40 to 300 barrels of oil to the mile are used on the first application, according to the condition of the road and the kind of material of which it is made.

The general rule is to use on the first application all the oil the surface material will absorb. No two roads are the same in these particulars, and success is largely dependent upon the judgment of the man directing the work. There is no fixed rule as to the interval of time between the first and second applications of oil. It depends largely upon the material of which the road is made. Ordinarily the second application does not need to be made for two or three months after the first, and is then more in the nature of repair to the weak places which develop in the roadway, than a general, complete oiling.

"Originally the Los Angeles county roadmakers used hot oil entirely; now they are substituting cold oil as fast as they can secure appliances for putting it on. The heating was done by the contractor, to about 180 degrees, the expansion being about two per cent., and the oil being measured and computed after heating. Its gravity was 14 degrees and under, and the percentage of asphalt from 25 to 60, very little of the latter grade, however, being obtainable. The oil used is of Los Angeles county production—from the Newhall, Puente, Whittier and Los Angeles City fields—and contract prices this year are 64, 73 and 74 cents at the loading tanks in the fields. The

additional cost, including freight and applying to the road, is about 30 cents per barrel.

"There is no fixed rule as to the quantity of oil used in renewal and repairs. Some roads will go one or two years without any repairs; others will have to be repaired more or less two or three times during each year, much depending on the thickness of the oil crust and the amount of travel over the road. The same conditions do not apply to any two roads in the county. It has been found that oil makes a road on any kind of soil, it being a question only of the amount of oil necessary to do the work.

"The city of Redondo Beach has ten miles of oiled streets, on a sandy alluvial soil. The work was begun in 1902. The streets are 70, 80 and 100 feet wide, and are oiled their full width. The roadbed is first rolled and harrowed, the oil applied and thoroughly mixed with the soil, and then rolled. An ordinary water-sprinkling cart is used for applying the oil, 375 barrels per mile being used on each of two applications, made five days apart. The oil is obtained from the Los Angeles field, at 70 cents per barrel, on cars at Los Angeles. It is of 11 or 12 degrees gravity, the per cent. of asphalt varying from 48 to 60.

It is heated at a cost of three cents per barrel, by passing steam through pipes in the car tank, under a pressure of about 90 pounds. The additional cost of applying the oil is \$60 per mile for each application. About 60 barrels of oil per mile are required each year in repairs, filling ruts, and maintaining a smooth surface.

"Fresno County—Fresno county has 130 miles of oiled roads and 29 miles of city streets. The work was begun in 1902. The roadbeds are composed of red and sandy soils, the latter having been found much the better for oil. The roads were first graded, well pulverized and harrowed, and the oil applied with a common ten-foot sprinkler, which produced a strip eleven to twelve feet in width, which has been found sufficient for country roads. From 60 to 100 barrels of oil per mile were used on the first application, depending upon the character of soil and the depth of loose surface. No heated oil was used. With regard to subsequent applications, no general rule is followed. Oil is put on whenever the dust begins to show in any great quantity. Much depends on the soil and the amount of travel. Chuck-holes are the chief trouble encountered in the maintenance of an oiled road in good condition, and in dealing with

these the Fresno supervisors use a small tank called a "potting tank," which has a hose attached to run the oil into the chuck-holes, which are then filled level with dirt. The oil used is obtained at the Kern fields, at a cost of 41 cents a barrel. It contains from 14 to 16 per cent. of asphalt. The average cost per mile of making the first application, in addition to the cost of the oil, is about \$25. Contrary to the experience in most other counties, the Fresno roadmakers claim that shade or cold weather hardens the oil and improves the roads.

"The city of Fresno has 29 miles of oiled streets, begun in 1902. The soil is sandy, and in many cases the street has been graded first, but no other preparations were made, the oil being applied to the natural earth. After oiling, a thin layer of sand was put on. In applying the oil a wagon-tank was used, the distributing pipe at the rear having a row of holes on its under side, causing the oil to flow directly downward. In most instances, the streets were oiled their full width of fifty-two feet between curbs. For simply laying the dust on an ordinary street surface, from 25 to 45 barrels of oil were used per block of 400 feet. On newly graded streets, from 75 to 100 barrels to a block of 400 feet. But one application was made the first year, and one each succeeding year, less oil being used each time. When applications were made in winter and spring months, the oil was heated by steam sufficiently to make it run freely. The oil cost 73 cents per barrel, and the expense of applying to the street was 7 cents per barrel."

# Road Maintenance.

BY PETER FORMAN, COUNTY ENGINEER OF MONMOUTH.

The organization, working and aim of our State Aid road system is now fairly well understood and appreciated by the people. So much benefit has already been received in the way of convenience, profit, comfort and inland improvement, that the practical good sense of the people approves its wisdom, and they are generally anxious to receive for themselves and their localities some of its many benefits.

In fairly considering the subject, according to its present situation, it seems most natural that a pertinent point for inquiry would be whether this movement, which has already wrought so much of real advantage, is so well and carefully grounded in its application, that it will become permanent and lasting for all future time. Such doubtless was the intention of its founders.

A careful examination of the text and spirit of the legislative enactments, upon which the system rests, shows that great care and forethought have been used to provide therein for a complete system of properly built, permanent public roads, which are to be kept intact and in proper form to insure their lasting and best future usefulness.

An impartial inspection of the methods of road building now in use shows that generally the work is well and thoroughly done, many good points of construction having been learned and adopted from the lessons derived from the past years of practical experience in the art. This is particularly true of the macadam pavements which have been laid, and it appears that that which will be mostly needed hereafter, to insure the greatest benefit from these roads and the outlay of money used in their construction, is a thorough system of repairs. This essential matter has been foreseen and carefully provided for in the State Aid Road Law, which created the system. The able chief of the State Road Bureau has repeatedly called attention to it in his valuable yearly reports, and has faithfully worked, in all

ways within his control, to forward and perfect this very important part of the work; yet we have strong reason to believe that this essential factor has been somewhat neglected, and that for lack of proper, prompt and intelligent maintenance, much good road work has already been allowed to deteriorate, and its usefulness thereby greatly impaired.

Taking the foregoing views of the matter, it will appear that right here is located the key and turning point which, in a large measure, are to determine whether these expensive roads, which we hope are the beginning of a great and beneficial system of permanent good roads, shall continue for all future time and fulfill their greatest measure of usefulness in its best and broadest sense, or whether, from simple neglect or inattention to some of the simple details of maintenance, they shall be suffered to fall into decay, and perhaps utter ruin.

Roads and pavements, however well laid, will inevitably wear out and deteriorate, and it is this well known tendency which we are to vigilantly watch and timely check. The ravages caused by the impact of travel, rents caused by obstructed drainage or unusual climatic changes, possible faults of original construction and the thousand other insidious evidences of threatened disintegration, must receive instant and minute attention and repair. Suffer no rent or weakness to broaden; apply the remedy of repair at once. By so doing you will quickly learn that your labor will perpetuate the existence of the road, that you can thus secure the desired end in the best and most economically known way, and that year by year your road will become better and require much less outlay to keep it up to its best standard of usefulness.

Questions like the following naturally arise upon a due consideration of this important subject:

Are the expensive roads we are building generally receiving the vigilant inspection and prompt repairing needed to insure their future permanence and stability? Is it not a matter of fact that quite extended sections of some of the expensive roads have already been allowed to lose their form and become badly ravelled, thus involving a heavy cost in the end to restore them, when a very small amount of repairs, applied at the time of the insidious beginning of the evil, would have stopped it?

This matter viewed in its true sense is very important, and will become a chief factor in deciding the question whether our road system will eventually become a blessing to the people, by the closer linking of their homes and home lives, or whether, by neglect and laxity of administration in repairing and maintain-



ing the good work, the well founded system shall fall into disrepute and the ancient sand and mud roads shall again come to be considered good enough for the needs of communication.

A volume might well be written upon this subject with reason and propriety. Within the scope of an abridged article like this it is only possible to treat upon it in a general way, in the hope of drawing attention to its importance, and causing an earnest inquiry to be made whether a better application of the principles of our road laws, that relate to the subject, should not be made.

The writer ventures to offer a few simple suggestions which appear to be applicable to the subject and a proper conclusion to what has been said.

See to it that the roads receive the *constant, particular inspection and repair*, as indicated in this article.

Always provide liberally, on the basis that only the best road material should be used for repairs.

Put the work in charge of the best, most conscientious supervisor you can secure. He should be able to give his entire, undivided attention to the work and be ready to act promptly. Delay in applying the remedy of repair will defeat the end sought.

Give to each supervisor a sufficient section of the work to occupy his whole time; thus by proper inspection his faithfulness and aptitude for the work can be accurately tested. Require thoroughness in every particular.

Do not commit the business to anyone, no matter what may be his influence or pull, for a political sop.

Try the methods of maintenance, as above recommended, and make a fair estimate of the proportionate cost and of the results obtained. You will then be able to judge fairly of their merits and economy.



# Are Our Roads Permanently Satisfactory?

BY J. J. ALBERTSON, COUNTY ENGINEER OF ATLANTIC AND CAMDEN COUNTIES.

It is contrary to the makeup of an American to be permanently satisfied with anything. About twelve years ago, when road improvement began to actively engage public attention, we were led to believe, largely through ignorance, that if we only had stone roads, we would be fixed for generations to come. The great Roman roads were cited as examples of permanence. These were wonders for their time, but even these have become impassable in almost every instance. All that is left of the paved Roman road from Jaffa to Jerusalem is carefully shunned by the hackmen of to-day. The road from Jerusalem to Damascus is a continuous line of boulders, so uneven that it is with difficulty that a donkey can select a safe place to put his feet. It would be useless to attempt a faster gait than a walk. The Appian Way, built about 300 years B. C., leading south from Rome, is the best known example of a permanent road. This was very expensively constructed, the bottom courses being made of large stones, held together in a solid mass by mortar of either cement or lime. On this foundation was placed a wearing surface of solid, hard, smooth stone, the joints of which are all neatly fitted together as ladies would join pieces of cloth for crazy patch-work. The same kind of pavement is permanently preserved in the exhumed city of Pompeii.

The modern roads in and about Rome are largely of concrete base, covered with small, square stone blocks, very much like an ordinary Belgian block, only about half the size of top surface. Another sample of a remarkably permanent road, but which I as yet have never inspected, is the great road in Peru, built by the Incas, no one knows when. In places this road is twenty feet wide and of a total length of about 2,000 miles. Parts of this pavement were cemented together with a bituminous cement,

which now is harder than the stone itself. What would not a Yankee give for the formula for this Peruvian cement! This road was a marvel to the great German explorer, Humboldt. He said that it surpassed any Roman road he had ever seen. To be sure, we do not know exactly to what strain these ancient roads were subjected. We do know that our modern highways are at times put to the severest tests. The ingenuity and versatility of the American will solve the most difficult problem, and accomplish what a half century ago would have been accounted an idle dream. The permanence of roads will be no exception.

With the increased railroad facilities, the demand for long lines of freight highways is not keeping pace with our other advancement. It is no longer possible to cart freight by wagon any great distance in competition with the railroad. If the farmers of New Jersey could get the same rate per mile for freight as their Western competitors, it would not be necessary to build freight roads except from our homes to the railroad stations. As we can't get this, we must meet the conditions as we find them.

My twelve years active experience in road building near a large city has led me to believe it is bad economy to use the same road for freight and pleasure driving. It is just like a man's using his Sunday clothes to go gunning or surveying. He soon has a suit that is not adapted to either. Man in his development has passed through several periods or ages, beginning with the earthen, the stone, the bronze, the iron, and some say we are about to enter the cement or concrete age. So it has been with road improvement. We started with earth and now are up to steel or concrete. Past experience has demonstrated that stone is not permanent as a road metal.

My experience in measuring the depth of stone on the different turnpike roads, about to be sold to the counties of Burlington and Camden, gave the most positive demonstration of the failure of crushed stone as a surface for permanent freight roads. Taking the actual depths of stone found from the original depths of stone the fact was demonstrated that the surface was worn away and blown off at the rate of about one inch per year on an average. I found one piece of macadam built upon a good gravel foundation, that had worn from eight inches to a depth of one and three-quarter inches and was still sustaining travel. These examinations fully convinced me that crushed stone is not the proper surfacing for heavy freight roads. I have been greatly interested in the experiments made by Gen.

Roy Stone in New York City with Schwab's new steel rail for wagons and automobiles. (This road has since been torn up).

Our stone roads would last much longer if we would load the wagons as our ancestors did. The ambition of an American impels him to do just all he can; thus as the highway improves, just in that proportion he increases his loads. This concentration of a great weight in a small space could be overcome, in a large degree, by distributing the same weight on a greater surface by the use of broad tires. To this point our people are becoming slowly educated.

The lives of our roads are greatly lengthened by frequent light coatings of gravel or even sand. These act as a cushion and take the first shock and wear. When we have considered the permanence of freight roads from every standpoint, we are forced to admit that granite or trap rock block carefully paved on concrete, between and outside of the tram rails, form the most lasting road. Elasticity and toughness are essentials to the permanence of a roadway. Hard wood blocks on end, asphaltum and bitumen have these qualities, but they all sooner or later decay. Steel embodies both of these requirements to a much greater degree and is more durable. I am looking forward to the solution of the question from this source.

With road building, like many other things, we can't do the best we know, but have to do the best we can, and cut the garment according to the cloth.

In counties like Atlantic, of large area and sparsely populated, and where the settlements are wide apart, it has been necessary to use a cheaper form of road than stone. This particular county is of a peculiar geological formation. It is favored with many good gravel deposits. When the foundation is formed with the local sand and covered with eight inches of good, compact gravel, well crowned, we have an ideal summer road for light work. These Atlantic county gravel roads have been maintained at a very reasonable cost per mile by the judicious scraping off of the worn out metal and replacing the same with a little fresh gravel. I notice that our wise Legislators have recently taken action looking toward clearing the roadsides of brush, weeds, etc. I am glad that the law was not prompted by the same incentive that brought forth the first English road law, which was that all trees and brush should be cut down for a space of two hundred feet on each side of the road. This was to prevent robbers from hiding by the roadside. The advisability

of encouraging shade trees on the sides of our improved roads is a subject of controversy in Camden county. Our supervisor of completed roads insists that shade is an injury to the roads. I contend that the grateful shade from a hot summer sun much more than compensates for an occasional rut in early spring.

As before stated, the demand for long freight wagon roads is decreased by our magnificent system of railroads. The social requirements, necessity for free rural mail delivery, carriages, automobiles and bicycles all demand good roads. In order to meet these requirements, I cannot suggest anything better, considering cost of building and our ability to pay for same, than our present road system. These, like most other good things, are only kept so by eternal vigilance.

# Meadow Roads a Successful Experiment.

BY STILLWELL H. TOWNSEND, ENGINEER.

Three years ago, when the Board of Freeholders of Cape May County asked me to prepare plans for the building of a State aid road across the meadow from Rio Grande to Holly Beach, I was at somewhat of a loss to know just what would be the best materials, taken as a whole, to use. While I have been familiar with salt meadows and building meadow causways all my life, to prepare plans for a road over these same meadows that, when completed, would be satisfactory to the State Road Commissioner and the Board of Freeholders was quite a different thing. As we had no thought of elevating above storm tides, the prominent idea to be kept in view was the use of materials that would stand the wash.

The route to be followed had been abandoned about fifteen years. Previous to that time it had been used, for a few years, as a means of travel to and from the Five Mile Beach. When this was built about one-half of the distance was laid crosswise with cedar slabs, the other half with small poles, then a very light coat of upland soil, thus making it a corduroy road for sure.

I will now give the readers of this article a description of how we constructed the new road.

As a means of securing a foundation, large gum trees with two opposite sides flattened were laid lengthwise; one was placed in the center, the other two about under the wheel ruts. Across these were laid poles, about three inches in diameter at the small end, the space between the stringers having first been filled with mud. Over the ends of the poles, at each side, were placed curb planks, 2x6 inches; these planks were securely fastened, edge up, to cedar piles driven six feet into the meadow and projecting four feet above the planks; these same planks were placed eight feet from the center line, thus giving us a sixteen-foot driveway.

A mud bank was carefully thrown upon each side against the outside of the planks, and thoroughly compacted. The meadow grass grows through this, making it more secure. A line of mud about two feet wide was placed on the inside of the planks and compacted, thus making an almost water tight trough. The remaining space between the curb planks was filled with upland soil to a level with the outside planks. Over this soil we used oyster shells, three bushels to the square yard, twenty-seven thousand bushels in all. Over the shells, before they were ground up, was spread a coat of good gravel. This gave us an elevation of about fourteen inches above the highest meadow passed over, and above tides except very severe northeast storms. It has been topped several times since it was completed, by storm tides, but it has withstood them beyond all expectations.

One mistake was made in not giving the road more crown before the shells were spread. I consider shells one of the best materials that can be used on meadow roads, with just enough gravel spread over them to bind them together. They will thus withstand almost any amount of wash.

A year ago last October we began the rebuilding of the Beesley's Point and Ocean City Turnpike, 1.75 miles across salt meadow. There had been a road on this same route for about twenty years. During that time all but sixteen hundred feet of it had been poled three times. Large trees had been cut and laid lengthwise, and poles nine feet long laid across them, butting in the middle. In some places this construction had settled four feet into the meadow. Profiting by our experience with the Rio Grande and Holly Beach road, we have one of the finest meadow roads in the State.

In constructing this road only eighteen hundred and seventy-five feet were repoled. This was done by placing six pine tree stringers lengthwise, and poles nine feet long crosswise over them, butting in the middle. We placed a double curb plank on each side the entire length of the meadow road in the following manner,—curb planks 2x6 inches were placed eight feet each side of the center line, securely fastened to cedar posts driven four feet into the old road bed; four feet beyond this curb (outside the old road bed) were placed 2x12 inch curb planks securely fastened to cedar piles, driven eight feet into the meadow and projecting four feet above the top of the planks. The inner posts and outer piles were securely tied together, the four feet space between the curb plank was filled with mud and



thoroughly compacted by ramming, and, after settling, again filled and rammed. Before the road was finished these mud banks were covered with gravel, thus making a splendid bicycle path on each side. The space between the inner curb was filled with upland soil, and after being thoroughly compacted, stood four inches in the center above the top of the inner curb planks. These were set to grade. The road was then covered with thirty-six thousand bushels of oyster shells, spread when the bed was not too soft from rain or any other cause. As soon as the shells were spread, a thin coat of Buck Hill gravel was spread over them; this was followed by a fifteen hundred pound roller, making the shells and gravel into one compacted mass. After the entire length had been covered in this manner, it was again gone over with a second coat, making in all about five inches of loose gravel used on the shells.

One inch above the top of the inner curb plank was placed a cedar plank 2x6 inches, and fastened to the top of posts holding the lower curb. When the heavy storm tides sweep over the road some of the crown is in danger of being carried off. These planks were placed there as a protection to the exposed side and to catch what might otherwise go entirely off the road. So far this protecting curb has answered the purpose.

In building meadow roads where it is not intended to elevate above the tides by filling in until all settling has been overcome, the chief aim should be to use materials that will make a solid foundation, stand the wash, and at the same time not overload the meadow and cause it to settle.







**Bitulithic Pavement, Main Street, Woodstown  
Salem County**



**Bitulithic Pavement, Woodstown  
Salem County**

# Bitulithic Pavement.

BOROUGH OF WOODSTOWN, SALEM COUNTY.

BY

ROBERT GWYNNE, JR.

In June, 1903, the property owners on Main street, Woodstown, Salem county, petitioned the Board of Freeholders that the street be improved under the State Aid Law, and that the bitulithic pavement be used for this purpose. The borough agreed to bear the entire expense of maintaining the road for fifty years if this pavement were used.

On May 11, 1904, County Engineer I. O. Acton presented the specifications to the Board and they were adopted. The specifications provided for a road 1.144 miles long and 24 feet wide, to be paved with the Warren bitulithic material. Commissioner Budd approved of the specifications, and proposals were duly invited. On July 13th the contract was awarded to the Standard Bitulithic Company, of Philadelphia, for \$36,258, or \$2.25 per yard. The State agreed to pay toward the same one-third of the cost of a first-class macadam road, sixteen feet wide. The work is now completed and some of the property owners, at their own expense, had the pavement extended to their gutter lines, thus making a fine finish to the road.

The new road is an ornament to the already pretty town, and has been visited by many persons interested in roads in other places. The bitulithic is an advance in high grade macadam pavement, holding all that is good, adding to it the bitumen surface, giving it long life and perfect traction, and, although of greater cost to build, is much cheaper to maintain.

## MATERIALS AND CONSTRUCTION.

Foundation—On the top of the sub-foundation shall be spread

a layer of hard, crushed stone to a depth of six inches, which shall then be compressed with a heavy steam roller. This shall be coated with a thin layer of bituminous semi-liquid cement, said bitumen to be sufficiently flexible to unite freely with the cold stone.

On top of this No. 1 composition shall be spread a heavy coating of hard, bituminous cement, for the purpose of firmly binding the cement together, and making it readily unite with the bituminous concrete wearing surface. One gallon of the bituminous cement will be used to each square yard of surface. On this prepared foundation shall be laid the wearing surface or pavement proper, which shall be composed of carefully selected, sound, hard, crushed stone, mixed with bitumen and laid as herinafter specified.

**Wearing Surface**—After heating the stone in a rotary mechanical dryer, to a temperature of about 250 degrees F., it shall be elevated and passed through a rotary screen, having six or more sections with varying sized openings, the maximum of which shall be  $1\frac{3}{4}$  inches, and the minimum 1.10 inch in diameter. The several sizes of stone thus separated by the screen sections, shall pass into a bin containing six sections or compartments. From this bin the stone shall be drawn into a weigh-box resting on a scale having seven beams. The stone from each bin is accurately weighed in the proportion which has been previously determined by laboratory test to give the best results; that is, the most dense mixture of mineral aggregate, and the one having inherent stability. From the weighbox each batch of mineral aggregate composed of different sizes accurately weighed as above, shall pass into a "twin pug" or other approved form of mixer. In this mixer shall be added a sufficient quantity of bituminous waterproof cement to thoroughly coat all the particles of stone and to fill all voids in the mixture. The bituminous cement shall, before mixing with the stone, be heated to between 200 degrees and 250 degrees F. The amount used in each batch shall be accurately weighed and used in such proportion as has been previously determined by laboratory examination to give the best results, and to fill the voids in the mineral aggregate. The mixing shall be continued until the combination is a uniform bituminous concrete. In this condition it shall be hauled to the street, and there spread on the prepared foundation to such depth that, after thorough compression with a steam road roller, it shall have a thickness of two inches. The

proportioning of the varying sizes of stone and bituminous cement shall be such that the compressed mixture shall, as closely as practicable, have the solidity and density of solid stone.

**Surface Finish**—After rolling the wearing surface, there shall be spread over it a thin coating of quick drying, bituminous flush coat composition, the purpose of this coating being to completely fill any unevenness or honeycomb which may appear in the surface of the mixture. There shall then be rolled into the surface a thin layer of stone chips, for the purpose of presenting a gritty surface, which will not be slippery.

**General**—Each layer of the work shall be kept as free as possible from dirt, so that it will unite with the succeeding layer.

The price bid per square yard must include the laying, mixing and furnishing of all materials, labor and implements necessary to complete the foundation and wearing surface.

The bituminous composition or cement shall, in each case, be free from water, petroleum oil, water gas or process tars, and shall be especially refined with a view to remove the light oil, naphthalene and other crystalline matter susceptible to atmospheric influences. If the fine crushed stone does not provide the best proportions of fine grained particles, they must be supplied by the use of, not to exceed fifteen per cent., hydraulic cement, pulverized stone, or very fine sand.

The road is then to be shouldered and rolled in accordance with the standard State specifications.

The wearing of this highway with its large traffic will be watched with care, for as travel increases the repair account increases also, until a permanent high grade pavement becomes a necessity. The macadam surface (when well maintained) is an ideal one, and any pavement that approaches this and stands wear and tear must meet with favor.





# Facts and Fallacies of Road Construction and Repair.

BY JOSIAH MILLER, COUNTY ENGINEER, SALEM. N. J.

In former years the construction and repair of our ordinary roads were all placed in the hands of local overseers, selected by the inhabitants of the township in which the road lay. The exigencies of local politics governed the selection of these overseers, and the ability or fitness of a candidate for the position cut a very small figure in either his nomination or election.

The policy of "rotation in office" was quite strictly adhered to, and the incumbent was "rotated" out before he was, by observation and experience, fitted to efficiently perform the duties of his official position.

It would seem that these men had one principle of road construction and maintenance, that they, in common with nearly all their fellow citizens, rigidly adhered to, and that was never to break the old foundation of the road.

In my judgment, this manner of road building and repair has done as much harm to our roads as any other one thing. However, to the average man this seems to be a cardinal principle of road building, never to be violated under any circumstances, and is the one fallacy that the engineer finds most difficult to remove.

The success or failure of a road depends primarily upon the degree of resistance offered by its surface to the pressure exerted by the wheels of a vehicle passing over it. If the sub-grade is properly constructed, the resistance of the surface material to travel depends upon either the amount of "grit" or the amount of binding material in its composition, or upon a combination of both. Grit is the hard, sharp, durable substance which forms the wearing surface of the road. It is held in place by the binding materials. These latter, as they occur in nature, may be divided into two classes, namely, plastic,—such as clay, and cementing, such as the fine particles of many stones, shells or

other primarily hard substances, which experience has demonstrated have the power, when very finely divided, of forming a natural cement or mortar of greater or less strength. Without considering any particular material, it is safe to say that all substances used for road building possess one or the other of these binding powers in a greater or less degree. When we consider the resistance of materials with plastic binders, we must recognize the fact that excessive moisture will destroy the bond. In the case of those with cementing binders, the presence of excessive moisture is not nearly so injurious.

In considering the construction and repair of a road, the character of the foundation, upon which we are to place the pavement, has a great influence, for good or evil, upon the surface of the road. When we construct or repair a road upon a sand foundation, it makes comparatively little difference whether we take special pains to properly prepare the foundation or not, because sand is practically free from any cohesive property whatever, and the wearing surface will, as a rule, form for itself a more or less satisfactory bed, and will stay where it is placed. When our old foundation contains a quantity of plastic material, the conditions are different. In all roads where the former wearing surface contains plastic material, the larger, gritty particles are, to a certain extent, forced below the surface of the road during wet weather, and, the plastic material being the finer, is brought to the top, forming mud in wet weather and dust in dry.

If we place a new covering upon the surface of the old road, without previous preparation, we have, in dry weather, a layer of dust, and, in wet weather, a layer of mud, between the old and new surfaces; thus cohesion between them is prevented, and, in consequence, the new material continually spreads, becoming thin where most travelled because it is forced toward the sides. To correct this error, material is scraped from the sides to the center of the road, and the operation is repeated until the new covering becomes so thin that frost and wet reach and act upon the old surface, loosening it to such an extent that a fairly effective consolidation of the two surfaces takes place. This is also true when we have an old gravel foundation to deal with, but in this case there is another factor to be considered, namely, the resistance of the old surface to adhesion with the new we are placing upon it. If the old road has been constructed of good materials, the surface is hard and firm, and in many, if not the

most instances, will cause the hardest, stony particles of the new surface material to crush, rather than to be driven into it. In this case we have a condition similar to the earth road, only "more so." The new surface, if of sufficient depth, will become hard and firm, and appear to have all the characteristics of an ideal gravel road. The general public, as it drives over the road, commends the wisdom of "the powers that be," and "the powers that be" congratulate themselves and the taxpayers upon the great saving of expense in construction, and all congratulate the contractor upon the fine work he has done. The contractor, if he has had experience, congratulates himself upon the fact that he has used just enough material to make himself safe on his year's maintenance, well knowing how matters will stand later on. In course of time, as the surface wears away and becomes thin, it will be noticed that, apparently without cause, this new material breaks and flakes off in layers, leaving the old surface of the road exposed in numerous places. The layer of fine material, assisted by the resistance of the old surface to the incorporation of the new, is now asserting itself. The old surface has been protected from wear and weather, and is hard and firm. When a fairly heavily loaded team passes over the road, and there happens to be a comparatively thin place in the surface, which has not been incorporated with the old road, it moves under the load, cracks and flakes off, or, as is usual in all gravels, fairly large stones lie next to the layer of fine material on the old foundation, and the wheels strike one of these, with the result that the stone is either crushed or turned over, thus heaving up the new surface surrounding it. The next team encounters a small, soft spot in the surface and breaks off a little more of the compacted material. This is repeated until there is quite a break in the road. These holes now occur in many places along the line and the general public begins to complain. The "powers that be" are fierce in their denunciation of the man or men who recommended that gravel, but no one thinks of denouncing those who are responsible for the manner in which the road was constructed, for "was it not built upon a good, hard foundation?" It was so constructed, most assuredly, and the wheels and the "good, hard foundation" are playing hammer and anvil with the new surface between them. The result is that the last condition of that road is, in some respects, worse than the first.

It is useless to offer further proof of the importance of proper preparation of the foundation for other materials, because, no

matter what the substance may be, the after conditions follow in due time.

The question of cheap, as against low priced construction, is a serious one, and, unfortunately, it is usually the low priced and not the cheap construction that wins out. Cheap construction is that which gives the greatest amount of wear for the greatest length of time for each dollar expended. Low priced construction, as a rule, means poor construction, and, in many cases, when the ultimate cost is considered, is expensive.

The mere breaking up and preparation of the surface of an old road adds very little to the first cost, and, in most cases, will pay a larger percentage of profit, in the reduction of future repairs, than any amount of care and labor expended on the surface material, for the latter cannot properly do its work if not protected by correct methods of sub-grade construction.

All roads built directly upon the old foundation, without due preliminary preparation, will soon reach the hammer and anvil stage. Even the foundation course of a macadam road cannot be forced into an old gravel or shell bed so that it will have a perfect bearing, with no tendency to creep. The fallacy of supposing it possible to secure adhesion between other materials less hard and old road surfaces should be apparent to all, and the practice, instead of being encouraged as it is, should be denounced.

The general public, by its intelligent approval of proper methods of construction, without regard to reasonable first cost, can do much to eliminate expensive future repairs on their roads if they will give the matter the attention that it deserves.

QUARRIES IN NEW JERSEY PRODUCING ROAD METAL.

BERGEN COUNTY.

LOCATION OF QUARRY.	OWNERS.	P. O. ADDRESS.
Edgewater	Cody Bros.	Edgewater, N. J.
Linwood	Carpenter Bros.	Linwood, N. J.
Shady Side	Brown & Fleming	Englewood, N. J.
Fairview	Fairview Stone Crushing Co.	1996 Chambers St., N. Y.

ESSEX COUNTY.

Montclair	Osborne & Marcellis	Upper Montclair, N. J.
Montclair	F. J. Marley	Little Falls, N. J.
Orange	Geo. Spottswood & Co.	Orange, N. J.
Millburn	G. A. Lighthipe & Son	Millburn, N. J.
Cedar Grove	F. J. Marley	Little Falls, N. J.
Montclair	Francisco Bros.	Orange, N. J.
Short Hills	Stewart Hartshorn	Orange, N. J.
Caldwell	P. A. Matthews	Caldwell, N. J.

HUDSON COUNTY

Bergen Hill	B. M. & J. F. Shanley	Newark, N. J.
Palisades	Palisade Construction Co., No. 1 Montgomery St., Jersey City, N. J.	
Palisades	Hudson County Contracting Co., No. 367 Communipaw Ave., Jersey City, N. J.	
Guttenberg	Meeks	Guttenberg, N. J.
Granton	Wagner & Duff	Granton, N. J.
Granton	F. J. Marley	Little Falls, N. J.
Woodcliff	John S. Lane & Sons	Guttenberg, N. J.
Shady Side	Bull's Ferry Land Co.	Guttenberg, N. J.

HUNTERDON COUNTY.

Byram Station	B. M. & J. F. Shanley	Newark, N. J.
Byram Station	Trenton Stone and Construction Co.	Trenton, N. J.
Lambertville	W. N. Ireland, Agent	1241 Filbert St., Phila., Pa.
Middle Valley	Middle Valley Trap Rock Co.	Middle Valley, N. J.

MERCER COUNTY.

Moores	Delaware River Quarry and Construction Co., Lambertville, N. J.	
Goat Hill	B. M. & J. F. Shanley	Jersey City, N. J.
Hopewell	Hopewell Quarry Co.	Hopewell, N. J.
Titusville	Trenton Stone and Construction Co.	Trenton, N. J.
Belmont	Mercer County Workhouse	Trenton, N. J.

MIDDLESEX COUNTY.

Deans	James & George Law	Monmouth Junction, N. J.
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## MORRIS COUNTY.

Nearly all road-building material in this county is of native rock, gneiss, granite and shale. The traps are mostly imported from other counties.

LOCATION OF QUARRY.	OWNERS.	P. O. ADDRESS.
Millington . . . . .	Morris County Crushed Stone Co. . .	Morristown, N. J.
Mountain View . . . . .	Standard Paving Co . . . . .	Mountain View, N. J.

## PASSAIC COUNTY.

Garret Mountain . . . . .	Francisco Bros. . . . .	Little Falls, N. J.
Paterson . . . . .	F. J. Marley . . . . .	Little Falls, N. J.
Paterson . . . . .	Paterson Crushed Stone Co. . . . .	Paterson, N. J.
Paterson . . . . .	New Jersey Stone Co. . . . .	Rutherford, N. J.
Paterson . . . . .	McKiernan & Bergen . . . . .	Paterson, N. J.
Notch Road . . . . .	F. J. Marley . . . . .	Little Falls, N. J.
Notch Road . . . . .	Dowling Construction Co. . . . .	Paterson, N. J.
Haledon . . . . .	R. M. Torbet . . . . .	Haledon, N. J.
Hawthorne . . . . .	Daniel & D. Stanley . . . . .	Hawthorne, N. J.
Preakness . . . . .	Colfax & Steelc. . . . .	Pompton, N. J.
Great Notch . . . . .	Wright & Lindsley . . . . .	Orange, N. J.
Paterson . . . . .	Preakness Stone Crushing Co. . . . .	Paterson, N. J.

## SOMERSET COUNTY.

Dunellen . . . . .	Garrison & Gray . . . . .	Dunellen, N. J.
North Plainfield . . . . .	N. B. Smalley . . . . .	Plainfield, N. J.
Bernardsville . . . . .	Somerset Stone Crushing Co. . . . .	Bernardsville, N. J.
Mine Brook . . . . .	James Freeman . . . . .	Mine Brook, N. J.
Plainfield . . . . .	J. H. Wilson & Co. . . . .	Plainfield, N. J.
Millington . . . . .	Millington Stone Co. . . . .	Millington, N. J.
Chimney Rock . . . . .	Bound Brook Crushed Stone Co. . . . .	Bound Brook, N. J.
Somerville . . . . .	William Hardgrove . . . . .	Somerville, N. J.
Rocky Hill . . . . .	Rocky Hill Stone Storage Co. . . . .	Rocky Hill, N. J.
Bernardsville . . . . .	Frank S. Tainter . . . . .	Morristown, N. J.
Far Hills . . . . .	Grant Schley . . . . .	Far Hills, N. J.
Bernardsville . . . . .	Mine Brook Stone Co . . . . .	Bernardsville, N. J.

## SUSSEX COUNTY.

Newton . . . . .	Newton State Quarry . . . . .	Newton, N. J.
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## UNION COUNTY.

Scotch Plains . . . . .	Hatfield & Weldon . . . . .	Scotch Plains, N. J.
Murray Hill . . . . .	Commonwealth Company . . . . .	Murray Hill, N. J.
Summit . . . . .	A. A. Potter . . . . .	Summit, N. J.
West Summit . . . . .	Victor G. Smythe . . . . .	West Summit, N. J.
Springfield . . . . .	Stewart Hartshorn . . . . .	Springfield, N. J.





**Tuckahoe Gravel Pit, Showing Distribution of Material**



## GRAVEL PITS IN NEW JERSEY USED FOR ROAD BUILDING.

## ATLANTIC COUNTY.

LOCATION OF PITS.	OWNERS.	P. O. ADDRESS.
May's Landing . . . . .	Estate of Wm. Post. . . . .	May's Landing, N. J.
May's Landing . . . . .	D. E. Izard . . . . .	May's Landing, N. J.
Estelville . . . . .	A. E. Bourgeois . . . . .	Estelville, N. J.
Tuckahoe . . . . .	Henry D. & Wm. G. Moore, Haddonfield, and 931 Chestnut St., Phila., Pa.	
May's Landing . . . . .	J. E. P. Abbott . . . . .	May's Landing, N. J.
May's Landing . . . . .	Samuel Champion . . . . .	May's Landing, N. J.
Pleasantville, . . . . .	West Jersey and Seashore Railroad . . . . .	Camden, N. J.
Pleasantville. . . . .	P. & A. C. Railroad . . . . .	Pleasantville, N. J.

## BURLINGTON COUNTY.

Riverton . . . . .	Lewis Connor . . . . .	Riverton, N. J.
Westfield . . . . .	Enoch Evans . . . . .	Westfield, N. J.
Westfield. . . . .	Estate of Wm. R. Lippincott. . . . .	Westfield, N. J.
Palmyra . . . . .	Isaac Evaul . . . . .	Palmyra, N. J.
Palmyra . . . . .	Wm. F. Morgan . . . . .	Palmyra, N. J.
Burlington . . . . .	Frank Warren . . . . .	Burlington, N. J.
Riverton . . . . .	Franklin T. Hunter . . . . .	Riverton, N. J.
Bridgeboro . . . . .	Edwin M. Brock . . . . .	Bridgeboro, N. J.
Moorestown . . . . .	Michael Flynn . . . . .	Moorestown, N. J.
Hartford . . . . .	John Warrick . . . . .	Hartford, N. J.
Rancocas . . . . .	James W. Stokes . . . . .	Rancocas, N. J.
Columbus . . . . .	Thomas A. Bunting . . . . .	Columbus, N. J.
Columbus . . . . .	Thomas H. Rogers. . . . .	Columbus, N. J.
Kinkora . . . . .	C. G. Kinsley . . . . .	Kinkora, N. J.
Columbus . . . . .	Edward Wilson . . . . .	Columbus, N. J.
Columbus . . . . .	Charles Sharp . . . . .	Columbus, N. J.
Florence . . . . .	George Bowne . . . . .	Florence, N. J.
Georgetown . . . . .	John P. Hutchinson. . . . .	Georgetown, N. J.
Jobstown . . . . .	Charles Black . . . . .	Jobstown, N. J.
Centerton . . . . .	Allen Austin . . . . .	Centerton, N. J.
Willingboro . . . . .	Mrs. John Buzby . . . . .	Willingboro, N. J.
Beverly . . . . .	J. H. Comb . . . . .	Beverly, N. J.
Burlington, . . . . .	Samuel Johnson . . . . .	Burlington, N. J.
Beverly . . . . .	William Baggs . . . . .	Beverly, N. J.
Beverly . . . . .	Joshua Fenimore . . . . .	Beverly, N. J.
Moorestown . . . . .	Samuel C. Decou . . . . .	Moorestown, N. J.

## CAPE MAY COUNTY.

Belle Plain . . . . .	West Jersey and Seashore Railroad . . . . .	Camden, N. J.
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## CUMBERLAND COUNTY.

Millville . . . . .	John Golder . . . . .	Millville, N. J.
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## ELEVENTH ANNUAL REPORT.

## MIDDLESEX COUNTY.

Old Bridge	I. Biddle Herbert	Old Bridge, N. J.
Helmetta	Geo. W. Helme	Helmetta, N. J.
Jamesburg	James Buckelew's Sons	Jamesburg, N. J.
Englishtown	Charles Hoffman	Englishtown, N. J.

## MONMOUTH COUNTY.

Hopping	D. G. Campbell	Middletown, N. J.
Navesink	D. R. G. Andrews	Navesink, N. J.
Hopping	Peter L. Conover	Atlantic Highlands, N. J.
Leonardville	John T. Hopping	Leonardville, N. J.
Red Bank	Mrs. Henry Field	Red Bank, N. J.
Red Bank	James Hubbard	Red Bank, N. J.
Red Bank	John L. Applegate	Red Bank, N. J.
Chapel Hill	Geo. T. Hopping	Chapel Hill, N. J.
Middletown	J. D. Conover	Middletown, N. J.
Farmingdale	Manasquan Gravel Co	Asbury Park, N. J.
Allenwood	Manasquan Gravel Co	Asbury Park, N. J.
Shark River	Manasquan Gravel Co	Asbury Park, N. J.
Navesink	Webster Swan	Navesink, N. J.
Holmdel	William Crawford	Holmdel, N. J.
Red Bank	Red Bank Gravel Co	Red Bank, N. J.

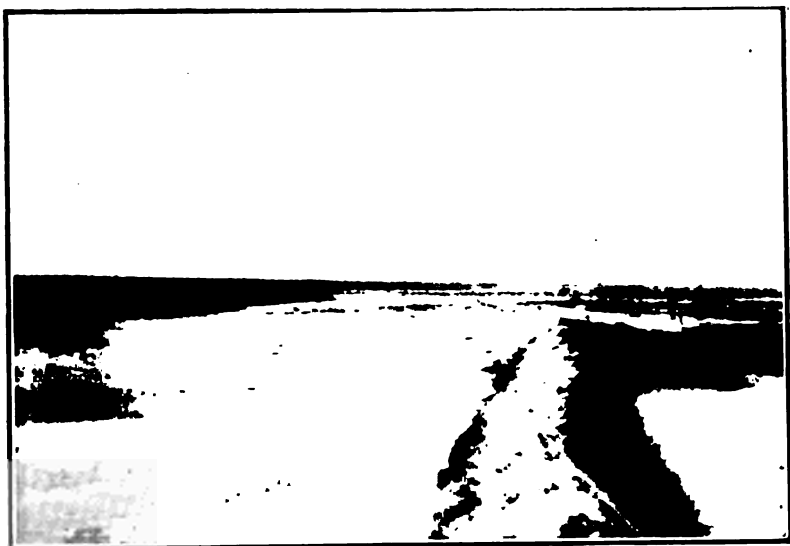
## OCEAN COUNTY.

Stafford	Staffordville Gravel Co	Staffordville, N. J.
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**Salt Meadows, Atlantic County**  
 These lie between the main land and the sea beach, and in places are  
 almost bottomless



**Pleasantville and Atlantic City Boulevard, Atlantic County**  
 Showing Sod banks for retaining material pumped in by the Dredge

# Statements by Engineers and Supervisors.

November 1st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Second Section Pleasantville and Atlantic City road, County of Atlantic, State of New Jersey. Total length, 5,280 feet, or 1 mile.

Width of gravel bed, 60 feet.

Length of gravel bed, 5,280 feet.

Depth of gravel bed, 6 inches.

File trestle, 278.15 lineal feet, at 625 cents; total .....	\$1,738 43
Earth fill, 159,442.24 cubic yards, at 18 cents; total.....	28,699 60
Bulkhead, 545.04 lineal feet, at 450 cents; total.....	2,45 270
Supervisor's salary .....	717 00
Engineering expenses, 3% .....	1,323 74
Total.....	\$34,931 47

Total allowed by the State .....	\$32,890 73
One-third of above, amount paid by the State, .....	10,963 58

Maximum grade before .....	level
Maximum grade after .....	level

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

J. J. ALBERTSON,  
Engineer.

H. W. BREDER,  
Supervisor.

November 3rd, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of Ridge-wood avenue, between macadam at borough of Delford and macadam near J. W. Winters, Township of Midland, County of Bergen, State of New Jersey. Total length, 8,850 feet, or 1.68 miles.

## ELEVENTH ANNUAL REPORT.

Width of stone-bed, 12 feet.  
 Length of stone-bed, 8,850 feet.  
 Depth of stone-bed, 5 inches.

Macadam, 11,800 square yards, at 41 ½ cents; total . . . . .	\$4,897 00
Earth excavation, 7,100 cubic yards, at 22 cents; total . . . . .	1,562 00
Supervisor's salary . . . . .	443 00
Engineering expenses . . . . .	354 00

Total . . . . .	<u>\$7,256 00</u>
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Lump sum, contract price . . . . .	\$6,459 00
Total allowed by the State . . . . .	2,153 00
One-third of above, amount paid by the State . . . . .	2,153 00

Maximum grade before . . . . .	9 per cent.
Maximum grade after . . . . .	6 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 5 inches.

Respectfully yours,

P. E. VAN BUSKIRK,  
 Engineer.

D. H. HOPPER,  
 Supervisor.

November 9th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
 NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Teaneck road, Ridgefield avenue, Hackensack road, Mt. Vernon street, Paulison avenue, Sixth street, Central and Railroad avenues, Township of Ridgefield, County of Bergen, State of New Jersey. Total length, 17,825 feet, or 3.62 miles.

Width of stone-bed, 16 feet.

Length of stone-bed, 17,825 feet.

Depth of stone-bed, 11,075 ft., 6 inches.— 6,750 ft., 10 inches.

Macadam, 19,690 square yards, at 65 cents; total . . . . .	\$12,789 50
Telford, 12,384 square yards, at 98 cents; total . . . . .	12,136 32
Earth excavation, 24,700 cubic yards, at 35 cents; total . . . . .	8,645 00
5 Trees removed . . . . .	2 50
Drain and incidentals . . . . .	483 12
Supervisor's salary . . . . .	267 00
Engineering expenses . . . . .	1,731 00

Total . . . . .	<u>\$36,054 44</u>
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Lump sum, contract price . . . . .	\$34,056 44
Total allowed by the State . . . . .	33,573 32
One-third of above, amount paid by the State . . . . .	11,191 11

# COMMISSIONER OF PUBLIC ROADS.

93

Maximum grade before .....	11.50 per cent.
Maximum grade after .....	5.53 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 and 10 inches respectively.

Respectfully yours,

RALPH D. EARLE JR.,  
Engineer.

F. J. STURGES,  
Supervisor.

HILLSDALE, N. J., Oct. 31st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Summit, Westwood and West Hillsdale avenues, Township of Hillsdale, County of Bergen, State of New Jersey. Total length, 4,675 feet, or .885 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 4,675 feet.

Depth of stone-bed, 6 inches.

Number of tons of stone used in construction, 1,125.

Macadam, 6,781 square yards, at 37 cents; total.....	\$2,508 97
Telford, 480.7 square yards, at 38 cents; total.....	182 67
Earth excavation, 3,490 cubic yards, at 19½ cents; total . . .	680 55
Supervisor's salary .....	60 00
Engineering expenses.....	216 00

Total.....	<u>\$3,648 19</u>
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Lump sum, contract price, .....	\$3,372 19
Total allowed by the State .....	3,372 19
One-third of above, amount paid by the State .....	1,124 06

Maximum grade before .....	5.4 per cent.
Maximum grade after .....	3.1 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

H. G. HERING, JR.,  
Engineer.

WILLIAM W. BANTA,  
Supervisor.

## ELEVENTH, ANNUAL REPORT.

October 27th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Fairview, Hillside, Washington, Lafayette and Fourth avenues, Borough of Westwood, County of Bergen, State of New Jersey. Total length, 16,850 feet, or 3.19 miles.

Width of stone-bed, 14 feet.  
Length of stone-bed, 16,850 feet.  
Depth of stone-bed, 4 inches.

Macadam, 24,093 square yards, at 32 cents; total.....	\$7,709 76
Earth excavation, 10,988 cubic yards, at 19 cents; total. . . .	2,087 72
Drain, relaying 12 in. pipe, 26 lineal feet, at 35 cents; total. . .	9 10
"    "    "    "    32    "    "    75    "    "    . . . .	24 00
"    "    "    "    40    "    "    75    "    "    . . . .	30 00
Engineering expenses.....	676 17

Total.....	<u>\$10,536 75</u>
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Lump sum, contract price .....	\$9,860 58
Total allowed by the State .....	9,860 58
One-third of above, amount paid by the State .....	3,286 86

Maximum grade before .....	8 per cent.
Maximum grade after.....	4.39 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 4 inches.

Respectfully yours,

LEMUEL LOZIER,  
Engineer.  
THOMAS E. BRICKELL,  
Supervisor.

November 4th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY.

DEAR SIR—Below find an exact detailed statement of the cost of Crosswicks street, City of Bordentown, County of Burlington, State of New Jersey. Total length, 3,136 feet, or .59 miles.

Width of stone-bed, 12 feet.  
Length of stone-bed, 3,136 feet.  
Depth of stone-bed, 6 inches.



Macadam, 4,174.7 square yards, at 65 cents; total.....	\$2,713 55
Wings, 62 square yards, at 65 cents; total.....	40 30
Telford, 373.3 square yards, at 60 cents; total.....	223 98
Drain, 300 lineal feet, at 12 cents; total.....	36 00
Supervisor's salary.....	150 00
Engineering expenses.....	55 00

Total.....	<u>\$3,218 83</u>
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Lump sum, contract price.....	\$2,750 00
Total allowed by the State.....	3,013 83
One-third of above, amount paid by the State.....	1,004 61

Maximum grade before.....	2.8 per cent.
Maximum grade after.....	2.8 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was not less than six inches.

Respectfully yours,

JOHN H. HUTCHINSON,  
Engineer.  
CHARLES E. WOODWARD,  
Supervisor.

October 28th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Vincentown and Red Lion road, Township of Southampton, County of Burlington, State of New Jersey. Total length, 18,435 feet, or 3.50 miles.

Width of stone-bed, 12 feet.  
Length of stone-bed, 18,435 feet.  
Depth of stone-bed, 6 inches.

Preparation of road-bed (cost).....	Nothing to County or State.
Macadam, 25,080.06 square yards, at 99 cents; total.....	24,821 34
Telford, including wings extra, 1,066.66 square yards, at 36 cents extra.....	total..... 383 99
Earth excavation, cubic yards; total.....	868 92
Supervisor's salary.....	660 00
Engineering expenses.....	504 05

Total.....	<u>\$27,238 30</u>
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Lump sum, contract price.....	24,334 00
Total allowed by the State.....	26,074 25
Less allowed by the State in 1903.....	11,175 00

Allowed by the state in 1894.....	\$14,899 25
One-third of above, amount paid by the State.....	4,966 42

Maximum grade before .....	5 per cent.
Maximum grade after .....	1.80 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

FRANK EARL,

Engineer.

E. EUGENE ANTRIM,

Supervisor.

November 1st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Westfield and Camden Turnpike road, Township of Stockton, County of Camden, State of New Jersey. Total length, 31,601 feet, or 5.985 miles.

Lump sum, contract price.....	\$32,203 00
Total allowed by the State .....	29,453 00
One-third of above, amount paid by the State .....	9,817 66

We hereby certify the above statement to be correct.

Respectfully yours,

J. J. ALBERTSON,

Engineer.

CAPE MAY, N. J., September 8th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Ocean City Turnpike, Township of Upper, County of Cape May, State of New Jersey. Total length, 11,759 feet, or 2.23 miles.

Width of gravel bed, 14 feet.

Length of gravel bed, 11,759 feet.

Depth of gravel bed, 6 and 8 inches on the upland (2,650 feet); 4 inches on meadow road (9,109 feet.)

Gravel, 3,797 cubic yards used.

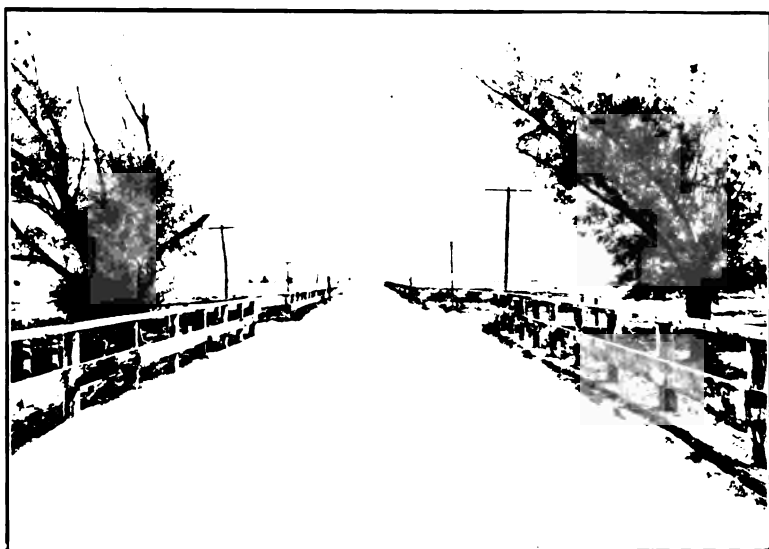
Oyster shells, 36,400 bushels used.

Two turnouts extra.....	200 00
Supervisor's salary .....	405 00
Engineering expenses .....	919 00
" " .....	\$1,524 00

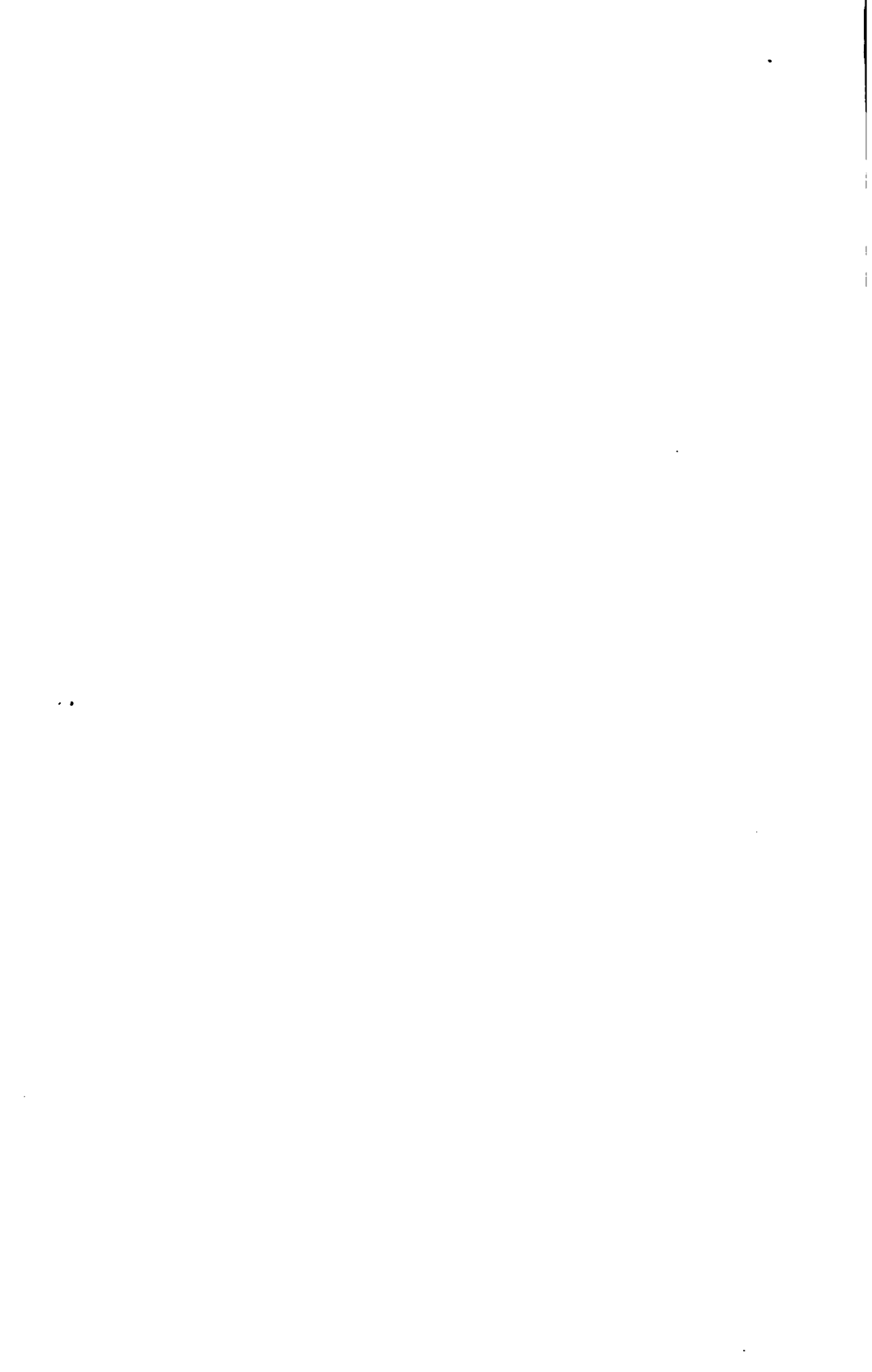
Total..... 26,944 05



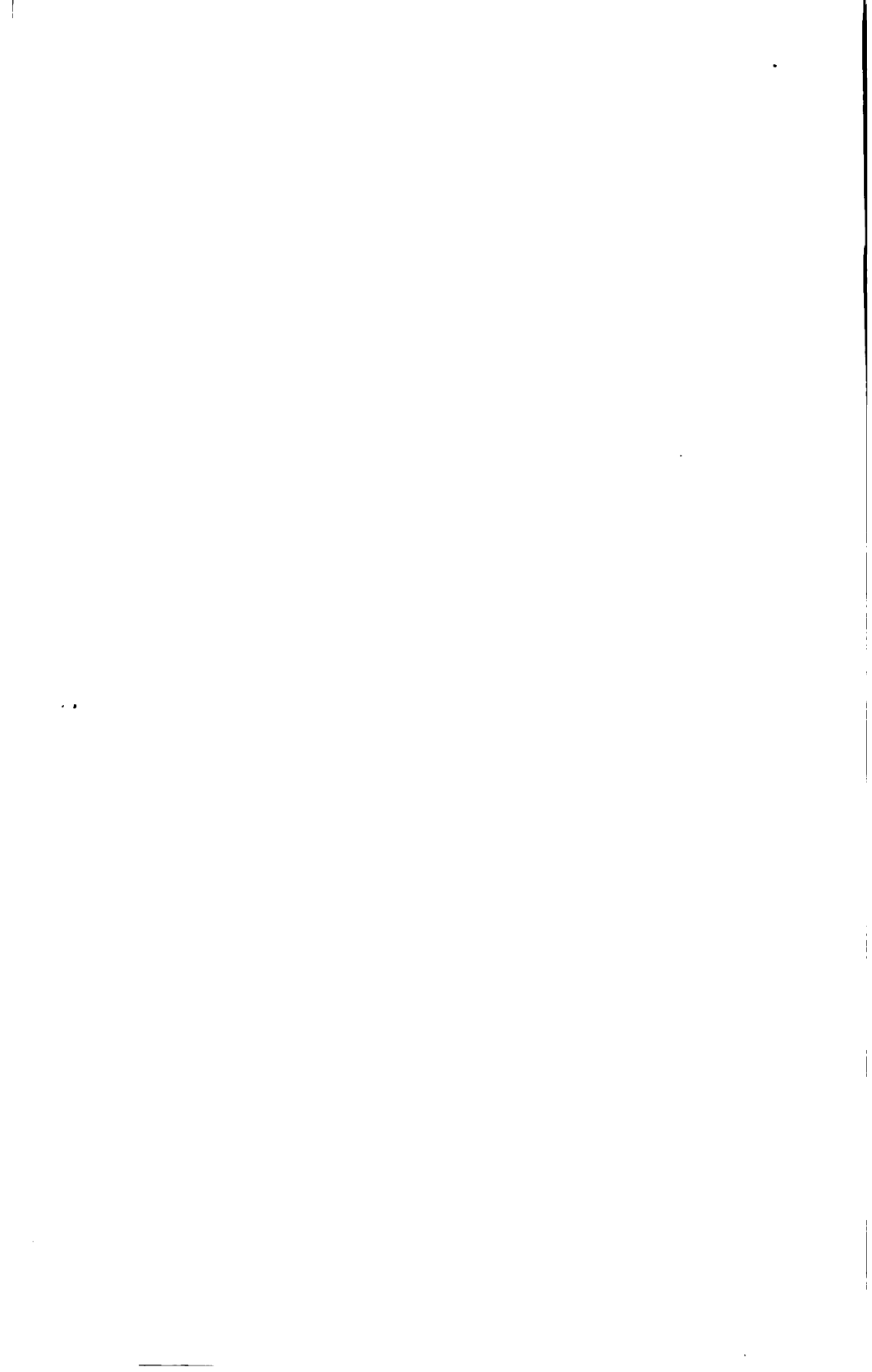
Ocean City Turnpike, Ocean City End, Cape May County  
After Improvement.



Ocean City Turnpike, Main Shore End, Cape May County









## ELEVENTH ANNUAL REPORT.

We hereby certify the above statement to be correct, and that the road was constructed strictly according to the specifications, and that the depth of finished gravel was twelve (12) inches.

Respectfully yours,

J. B. REYNOLDS,  
Engineer.

JOSEPH SUTTON,  
Supervisor.

November 1st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Swamp road, Township of Livingston and Borough of West Caldwell, County of Essex, State of New Jersey. Total length, 24,629 feet, or 4.663 miles.

Width of stone-bed, 16 feet.  
Length of stone-bed, 24,592 feet.  
Depth of stone-bed, 8 inches.

Telford, 43,736 square yards, at 55 cents; total.....	\$24,096 65
Earth excavation, 19,831 cubic yards, at 35 cents; total.....	6,940 85
Total.....	<u>\$31,010 50</u>
Total allowed by the State.....	31,010 50
One-third of above, amount paid by the State.....	10,336 83
Maximum grade before.....	11 per cent.
Maximum grade after.....	3.24 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAS. OWEN,  
Engineer.

JOHN ROESWIG,  
Supervisor.

November 1st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Hobart's Gap road, Townships of Livingston and Millburn, County of Essex, State of New Jersey. Total length, 20,499 feet, or 3.882 miles.

Width of stone-bed, 16 feet.  
Length of stone-bed, 20,459 feet.  
Depth of stone-bed, 8 inches.



# COMMISSIONER OF PUBLIC ROADS.

99

Telford, 36,716 square yards, at 65 cents; total .....	\$23,865 40
Earth excavation, 27,285 cubic yards, at 40 cents; total .....	10,914 00

Total.....	\$34,799 40
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Total allowed by the State .....	34,799 40
One-third of above, amount paid by the State .....	11,599 80

Maximum grade before .....	16.64 per cent.
Maximum grade after .....	4.53 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAS. OWEN,  
Engineer.  
S. B. PARSIL,  
Supervisor.

October 24th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Extension of Scotch road, Townships of Ewing and Hopewell, County of Mercer, State of New Jersey. Total length, 10,307 feet, or 1.95 miles.

Width of stone-bed, fourteen (14) feet.  
Length of stone-bed, 10,307 feet.  
Depth of stone-bed, Class B or six (6) inches.

Macadam, 16,345 square yards.....	}	\$13,220 00
Earth excavation, 12,050 cubic yards.....		
Extra rock excavation, 415 cubic yards, at 100 cents; total .....		415 00
Drain, 16,270 lineal feet, at 22 cents; total .....		3,579 40
Supervisor's salary .....		606 00
Engineering expenses.....		430 36

Total.....	\$18,250 76
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Lump sum, contract price .....	13,220 00
Total allowed by the State .....	17,214 40
One-third of above, amount paid by the State .....	5,738 13

Maximum grade before .....	10.6 per cent.
Maximum grade after .....	5.9 per cent.

## ELEVENTH ANNUAL REPORT.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was Class B or six inches.

Respectfully yours,

FRANK J. EPPELE,  
Engineer.  
AARON C. COOK,  
Supervisor.

October 24th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Princeton Hill road, Township of Princeton, County of Mercer, State of New Jersey. Total length, 3,680 feet, or .70 mile.

Width of stone-bed, (14) feet.  
Length of stone-bed, 3,540 feet.  
Depth of stone-bed, Class B or six (6) inches.

Macadam, 5,530 square yards. ....	)	\$8,400 00
Earth excavation, including rock, 6,350 cubic yards.....	}	
Additional excavation, 316 cubic yards, at 60 cents; total . . .		189 60
Drain, 311 lineal feet, at 20 cents; total.....		62 20
Supervisor's salary .....		468 00
Engineering expenses.....		216 30
Total.....		<hr/> \$9,336 10
Lump sum, contract price .....		8,400 00
Total allowed by the State .....		8,651 80
One-third of above, amount paid by the State .....		2,883 93

Maximum grade before. .... 13.0 per cent.  
Maximum grade after. .... 5.94 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was Class B or six inches.

Respectfully yours,

FRANK J. EPPELE,  
Engineer.  
R. H. ROSE,  
Supervisor.

October 24th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Harbournon road, Township of Ewing, County of Mercer, State of New Jersey. Total length, 9,000 feet, or 1.70 miles.



**Princeton Hill, Mercer County, looking toward Canal  
During Improvement**



**Princeton Hill, Mercer County, looking toward Canal  
After Improvement**







**Princeton Hill Road, Mercer County, looking through cut from Canal  
During Improvement**



**Princeton Hill Road, Mercer County, looking through cut from Canal  
After Improvement**

# COMMISSIONER OF PUBLIC ROADS.

101

Width of stone-bed, fourteen (14) feet.  
Length of stone-bed, 9,000 feet.  
Depth of stone-bed, Class B or six (6) inches.

Macadam, 14,088 square yards.....	} \$12,281 00
Earth excavation, including rock, 11,825 cubic yards.....	} 147 00
Additional excavation, 294 cubic yards, at 50 cents; total....	2,829 20
Drain, 12,860 lineal feet, at 22 cents; total.....	423 00
Supervisor's salary.....	381 43
Engineering expenses.....	

Total..... \$16,061 63

Lump sum, contract price.....	12,281 00
Total allowed by the State.....	15,257 20
One-third of above, amount paid by the State.....	5,085 73

Maximum grade before.....	9.0 per cent.
Maximum grade after.....	3.9 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was Class B or six inches.

Respectfully yours,

FRANK J. EPPELE,  
Engineer.  
JAMES F. HERBERT,  
Supervisor.

October 31st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR:—Below find an exact detailed statement of the cost of the Mercerville and Lawrence Station road, Townships of Hamilton, Lawrence and West Windsor, County of Mercer, State of New Jersey. Total length, 16,921 feet, or 3.20 miles.

Width of stone-bed, fourteen (14) feet.  
Length of stone-bed, 16,921 feet.  
Depth of stone-bed, Class B or six (6) inches.

Macadam, 26,600 square yards.....	} \$18,228 00
Earth excavation, 11,550 cubic yards.....	} 1,749 00
Additional excavation, 2,915 cubic yards, at 60 cents; total..	1,906 08
Drain, 8,664 lineal feet, at 22 cents; total.....	339 00
Supervisor's salary.....	547 08
Engineering expenses.....	

Total..... \$22,769 16

## ELEVENTH ANNUAL REPORT.

Lump sum, contract price.....	18,228 00
Total allowed by the State.....	21,883 08
One-third of above, amount paid by the State.....	7,294 36

Maximum grade before.....	4.00 per cent.
Maximum grade after.....	2.25 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was Class B or six inches.

Respectfully yours,

FRANK J. EPPELE,  
Engineer.  
R. M. EVERETT,  
Supervisor.

NEW BRUNSWICK, N. J., Oct. 25th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Landing Bridge and New Market road, Township of Piscataway, County of Middlesex, State of New Jersey. Total length, 7,920 feet, or 1.50 miles.

Width of stone-bed, 12 feet.  
Length of stone-bed, 7,920 feet.  
Depth of stone-bed, 8 inches.  
Number of tons of stone used in construction, 3,937 5-10.

Macadam, 10,560 square yards, at 63 cents; total.....	\$6,652 80
Macadam, extra, 257 square yards, at 63 cents; total.....	161 91
Earth excavation, 4,587 cubic yards, at 38 cents; total.....	1,743 06
Supervisor's salary.....	288 00
Engineering expenses.....	169 92
Total.....	\$9,015 69

Lump sum, contract price.....	8,495 86
Total allowed by the State.....	8,457 77
One-third of above, amount paid by the State.....	2,819 26

Maximum grade before.....	7.5 per cent.
Maximum grade after.....	4 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,  
Engineer.  
GEORGE W. CORIELL,  
Supervisor.

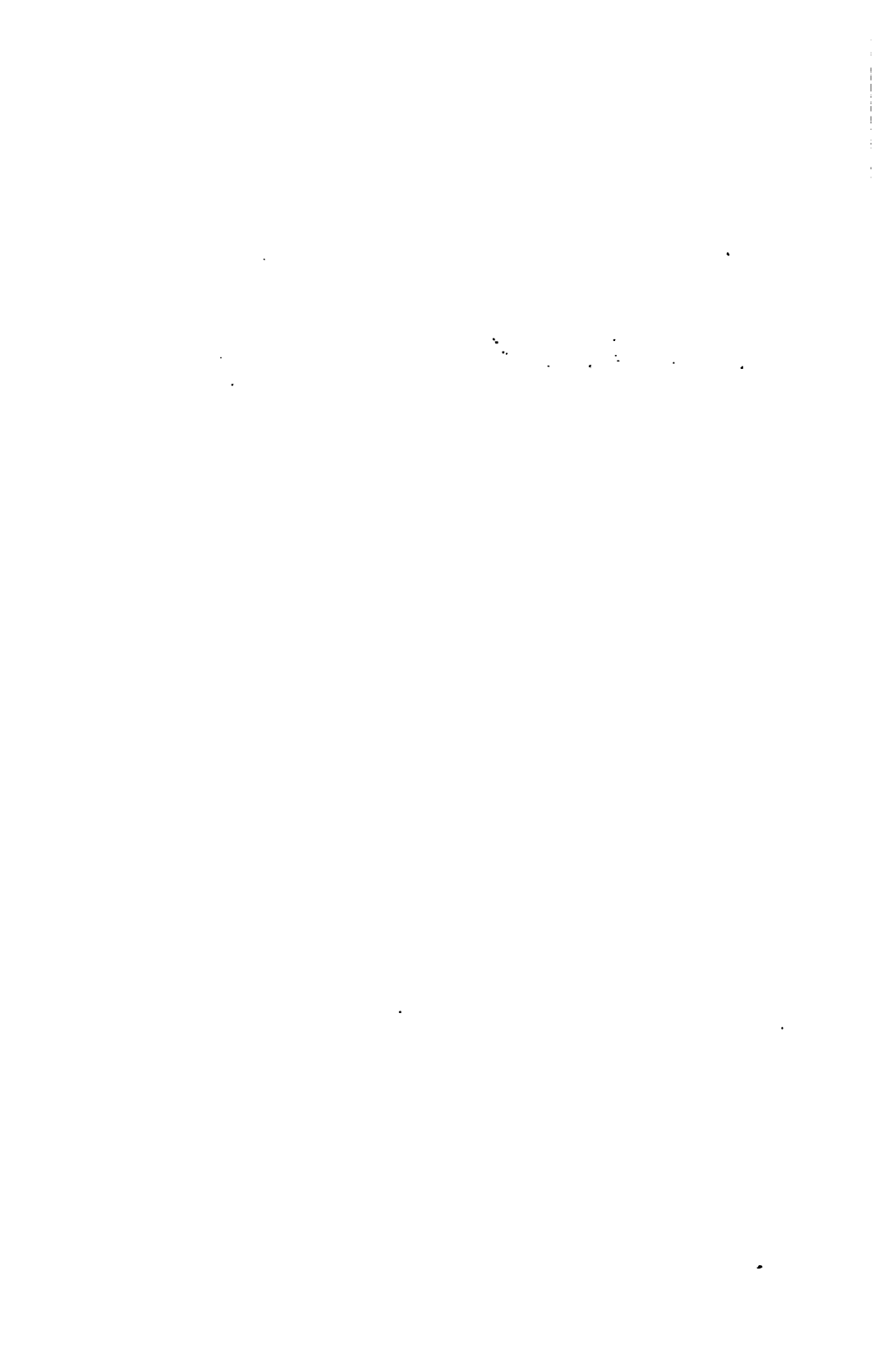




**Landing Bridge and New Market Road, Middlesex County  
Before Improvement**



**Landing Bridge and New Market Road, Middlesex County  
After Improvement**



NEW BRUNSWICK, N. J., October 27th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Bridge Approach, Ridgeway avenue and Fourth street, Township of Sayreville, County of Middlesex, State of New Jersey. Total length, 6,624 feet, or 1.25 miles.

Width of stone-bed, 16 and 18 feet.

Length of stone-bed, 6,624 feet.

Depth of stone-bed, 6 inches.

Macadam, 12,550 square yards, at 64.6012 cents; total.....	8,107 46
Earth excavation, 14,578.1 cubic yards, at 38 cents; total....	5,539 68
Earth excavation, extra 5,459 cubic yards, at 38 cents; total..	2,074 42
Drain, 1,200 lineal feet, at 40 cents; total.....	480 00
Laying and hauling iron pipe.....	145 00
Supervisor's salary.....	525 00
Engineering expenses.....	272 94

Total.....	<u>\$17,144 50</u>
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Lump sum, contract price.....	\$13,647 14
Total allowed by the State.....	14,127 14
One-third of above, amount paid by the State.....	4,709 05

Maximum grade before.....	7.0 per cent.
Maximum grade after.....	5.0 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was six inches.

Respectfully yours,

R. J. DOUGHERTY,  
Engineer.

W. O. MAXFIELD,  
Supervisor.

NEW BRUNSWICK, N. J., October 25th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Woodbridge and Oak Tree road, First Section, Township of Woodbridge, County of Middlesex, State of New Jersey. Total length, 12,112 feet, or 2.30 miles.

Width of stone bed, 12 feet.

Length of stone-bed, 12,112 feet.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 6,037.5.

## ELEVENTH ANNUAL REPORT.

Macadam, 16149.7 square yards, at 67 cents; total.....	\$10,820 30
Earth excavation, 13,346.3 cubic yards, at 30 cents; total....	4,003 89
Drain, 2,000 lineal feet, at 15 cents; total.....	300 00
Supervisor's salary .....	348 00
Engineering expenses .....	210 54

Total.....	<u>\$15,682 73</u>
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Lump sum, contract price .....	\$15,129 19
Total allowed by the State .....	15,124 19
One-third above, amount paid by the State.....	5,041 39

Maximum grade before .....	5.37 per cent.
Maximum grade after .....	3.10 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,  
Engineer.

JOHN TREEN,  
Supervisor.

NEW BRUNSWICK, N. J., October 25th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Extension of the Sayreville road, Township of Sayreville, County of Middlesex, State of New Jersey. Total length, 13,345 feet, or 2.53 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 13,345 feet.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 6,641.25.

Macadam, 17,793 3-10 square yards at 67.881 cents; total....	\$12,078 24
Macadam, extra, 47 square yards, at 68 cents; total .....	31 96
Grading cross-road at intersection.....	43 50
Furnishing and carting bricks and building retaining wall; total.	383 80
Earth excavation, 3,571 cubic yards, at 35 cents; total .....	1,249 85
Earth excavation, extra 22,547 cubic yards, at 35 cents; total	7,891 45
Extra work on account of washouts .....	37 50
Drain 1,263 lineal feet, at 20 cents; total .....	252 60
Supervisor's salary .....	282 00
Engineering expenses .....	266 57

Total.....	<u>\$22,517 47</u>
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**Sayreville Road, Middlesex County**  
**Before Improvement**



**Sayreville Road, Middlesex County**  
**After Improvement**



# COMMISSIONER OF PUBLIC ROADS.

105

Lump sum, contract price .....	13,328 09
Total allowed by the State .....	21,504 10
One-third of above, amount paid by the State .....	7,168 03

Maximum grade before .....	5.00 per cent.
Maximum grade after .....	2.25 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,  
Engineer.  
JAMES COLLINS,  
Supervisor.

NEW BRUNSWICK, N. J., November 21th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Franklin Park Road, Townships of North Brunswick and Franklin, Counties of Middlesex and Somerset, State of New Jersey. Total length, 13,300 feet, or 2.53 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 13,300 feet.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 6,141.25.

Macadam, 14,878.5 square yards, at 69 cents; total .....	\$10,265 96
Telford, 2,933 square yards, at 69 cents; total .....	2,023 77
Earth excavation, 18,252 cubic yards, at 30 cents; total .....	5,475 60
Extra excavation, 1,350 cubic yards, at 30 cents; total .....	405 00
Drain, 417 lineal feet, at 12 cents; total .....	50 04
Supervisor's salary .....	495 00
Engineering expenses .....	756 31

Total .....	\$19,471 68
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Lump sum, contract price .....	18,220 37
Total allowed by the State .....	9,110 37
One-third of above, amount paid by the State .....	3,036 73
Maximum grade before .....	3.78 per cent.
Maximum grade after .....	2.50 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,  
Engineer.  
ERNEST C. TAGGART,  
Supervisor.

JOSHUA DOUGHTY, JR.,  
Somerset County Engineer.

## ELEVENTH ANNUAL REPORT.

NEW BRUNSWICK, N. J., October 25th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the State Reform School road, Township of Monroe, County of Middlesex, State of New Jersey. Total length, 5,064 feet, or 96-100 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 5,064 feet.

Depth of stone-bed, 8 inches.

Macadam, 6,751.5 square yards, at 70 cents; total .....	\$4,726 05
Earth excavation, 5,437.8 cubic yards, at 22 cents; total .....	1,196 32
Drain, 2,400 lineal feet, at 14 cents; total .....	336 00
Drain, extra 2,778 lin. ft. at 14 cents; total .....	388 92
Supervisor's salary .....	219 00
Engineering expenses .....	129 91
<b>Total .....</b>	<b>\$6,996 20</b>
Lump sum, contract price .....	6,495 74
Total allowed by the State .....	6,647 29
One-third of above, amount paid by the State .....	2,215 76

Maximum grade before .....	5.50 per cent.
Maximum grade after .....	4.10 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,

Per J. Engineer.

D. G. ROWLAND,

Supervisor.

NEW BRUNSWICK, N. J., October 27th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Morristown and Lawrence Harbor road, Township of Madison, County of Middlesex, State of New Jersey. Total length, 10,503 feet, or 1.98 miles.

Width of gravel bed, 12 feet.

Length of gravel bed, 10,503 feet.

Depth of gravel-bed, 6 and 10 inches.







**Manalapan and Freehold Road, Monmouth County  
Before Improvement**



**Manalapan and Freehold Road, Monmouth County  
After Improvement**

# COMMISSIONER OF PUBLIC ROADS.

107

Gravel, 3,107 cubic yards, at 57.1 cents; total .....	\$1,775 00
Hauling gravel 782 cubic yards, at 30 cents; total .....	234 60
1,082 cubic yards, at 45 cents; total .....	486 90
782 cubic yards, at 60 cents; total .....	469 20
Earth excavation, 5,100 cubic yards, at 25 cents; total .....	1,275 00
Brick Bats, 1,237 cubic yards, at 40 cents; total .....	494 80
Drain, hauling and placing Iron pipe .....	110 00
Supervisor's salary .....	216 00
Engineering expenses .....	105 40

Total .....	\$5,166 90
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Lump sum, contract price .....	\$3,050 00
Total allowed by the State .....	4,240 70
One-third of above, amount paid by the State .....	1,413 57

Maximum grade before .....	10.00 per cent.
Maximum grade after .....	4.20 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 10 and 6 inches.

Respectfully yours,

R. J. DOUGHERTY,

Engineer.

FRANK P. LAMBERTSON,  
Supervisor.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Manalapan and Freehold road, Second Section, Townships of Manalapan and Freehold, County of Monmouth, State of New Jersey. Total length, 17,896 feet, or 3.38 miles.

Width of stone bed, 14 feet.

Length of stone-bed, 17,896 feet.

Depth of stone-bed, 8 inches.

Macadam, 27,838 2-9 square yards, at 70 cents. ....	} \$24,900 00
Earth excavation, 30,000 cubic yards, at 15 cents. ....	
Drain, 1,500 lineal feet, at 15 cents. ....	
Changing water course .....	60 00
Supervisor's salary .....	450 00
Engineering expenses .....	560 25

Total .....	\$25,970 25
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Lump sum, contract price .....	24,900 00
Total allowed by the State .....	24,960 00
One-third of above, amount paid by the State .....	8,320 00

Maximum grade before .....	4.20 per cent.
Maximum grade after .....	2.05 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

PETER FORMAN,

Engineer.

ISAAC B. DAVISON,

Supervisor.

November 10th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Matawan and Keyport road, Townships of Matawan and Raritan, County fo Monmouth, State of New Jersey. Total length, 9,650 feet, or 1.83 miles.

Width of stone-bed, 16 and 30 feet.

Length of stone-bed, 9,650 feet.

Depth of stone-bed, 6 inches.

Macadam, 17,155 square yards, at 64 cents; total .....	\$10,979 20
Extra 2,573 square yards, at 64 cents; total .....	1,646 72
Telford, 505 square yards, at 125 cents; total .....	
Gravel, 2,115 cubic yards, at 200 cents; total .....	4,320 00
Earth excavation, 8,036 cubic yards, at 20 cents; total .....	1,607 20
Drain, 3,240 lineal feet, at 8 cents; total .....	259 20
Supervisor's salary .....	300 00
Engineering expenses .....	600 00

Total .....	\$20,253 57
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Lump sum, contract price .....	\$16,900 00
Total allowed by the State .....	17,043 20
One-third of above, amount paid by the State .....	5,681 07

Maximum grade before .....	8.00 per cent.
Maximum grade after .....	3.20 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

FRANK OSBORN,

Engineer.

LEVI S. EMMONS,

Supervisor.





**Mount Freedom Road, Morris County  
During Improvement.**



**Mount Freedom Road, Morris County  
After Improvement.**

# COMMISSIONER OF PUBLIC ROADS.

109

November 10th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Mount Freedom or Newton Turnpike road, Township of Randolph, County of Morris, State of New Jersey. Total length, 13,100 and 2,950 feet, or 3.04 miles.

Width of stone-bed, 12 feet.

Depth of stone-bed, 6 inches.

Number of tons of stone used in construction, 820

Macadam, 3,933 square yards, at 36 cents; total.....	\$1,415 88
Overhaul, 27,771 cubic yards, . . . . .	2,638 31
Earth excavation, 4,788 cubic yards, at 22 cents; total . . . . .	1,053 36
Rock excavation, 26,652 cubic yards, at 100 cents; total . . . . .	26,652 00
Drain, Stone, 393 lineal feet, at 14 cents; total . . . . .	55 02
Drain, 24 in. iron, 60 lineal feet, at 325 cents; total . . . . .	195 00
Supervisor's salary . . . . .	846 00

Total.....	<u>\$32,855 57</u>
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Lump sum, contract price . . . . .	\$31,814 57
Total allowed by the State . . . . .	31,814 57
One-third of above, amount paid by the State . . . . .	10,604 86

Maximum grade before . . . . . 18 per cent.

Maximum grade after . . . . . 6.50 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

WM. E. KING,

Engineer.

HORACE BAIRD,

Supervisor.

MORRISTOWN, N. J., November 9th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Lincoln Park, Montville and Boonton road, Township of Montville, County of Morris, State of New Jersey. Total length, 15,508 feet, or 2.94 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 15,508 feet.

Depth of stone-bed, 6 inches.

Number of tons of stone used in construction, 8,493.

Macadam, 20,410.67 square yards, at 38 cents; total .....	\$7,756 05
Tile Drain, 6 in., 42 lineal feet, at 50 cents; total .....	28 00
Tile Drain, 12 in., 254 lineal feet, at 75 cents; total .....	190 50
Tile Drain, 15 in., 304 lineal feet, at 100 cents; total .....	304 00
Iron Drain, 16 in., 338 lineal feet, at 250 cents; total .....	845 00
Iron Drain, 24 in., 37 lineal feet, at 325 cents; total .....	120 25
Earth excavation, 60,726 cubic yards, at 24 cents; total, . . . .	14,574 24
Rock excavation, 1,160 cubic yards, at 200 cents; total .....	2,320 00
Dry Wall, 941 cubic yards, at 243 cents; total .....	2,286 63
Supervisor's salary .....	558 00

Total .....	<u>\$28,975 67</u>
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Total allowed by the State .....	\$24,650 29
One-third of above, amount paid by the State .....	8,216 76

Maximum grade before .....	9 per cent.
Maximum grade after .....	6 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was six inches.

Respectfully yours,

WM. E. KING,

Engineer.

THOMAS BYARD,

Supervisor.

CEDAR RUN, N. J., October 24th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Eagleswood Main Shore road, Township of Eagleswood, County of Ocean, State of New Jersey. Total length, 16,117.7 feet, or 3.05 miles.

Width of gravel-bed, 30 and 22 feet.

Length of gravel-bed, 16,117.7 feet.

Depth of gravel-bed, 9 and 4 inches.

Preparation of road-bed (cost), 2.16 acres grubbing at \$10. . . .	21 60
Gravel, 7,457 cubic yards, at 70 cents; total .....	5,219 90
Earth excavation, 13,031 cubic yards, at 20 cents; total .....	2,606 20
Supervisor's salary .....	564 00
Engineering expenses .....	392 40

Total .....	<u>\$8,804 10</u>
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Lump sum, contract price .....	\$7,228 10
Total allowed by the State .....	7,848 10
One-third of above, amount paid by the State .....	2,616 03

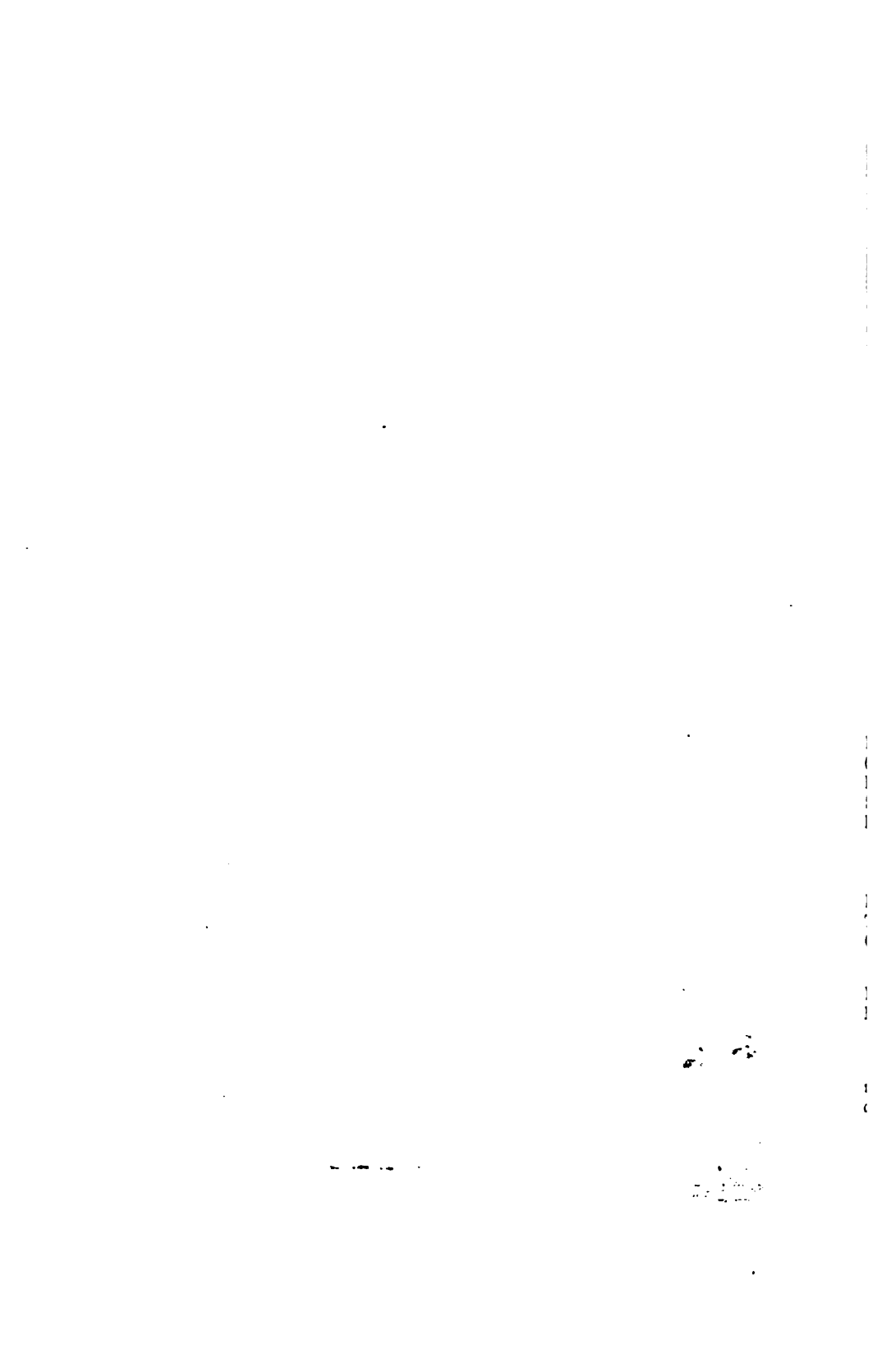




**Eagleswood Main Shore Road, Ocean County  
Before Improvement**



**Eagleswood Main Shore Road, Ocean County  
After Improvement**



# COMMISSIONER OF PUBLIC ROADS.

III

Maximum grade before ..... 4.70 per cent.  
Maximum grade after ..... 1.60 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 9 and 4 inches.

Respectfully yours,

I. H. CRAMER,

Engineer.

NATHAN B. COX,

Supervisor.

CEDAR RUN, N. J., November 7th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Stafford Township road, First Section, Township of Stafford, County of Ocean, State of New Jersey. Total length, 12,200 feet, or 2.31 miles.

Width of gravel-bed, 24 feet.

Length of gravel-bed, 12,200 feet.

Depth of gravel-bed, 9 and 3 1-3 inches.

Preparation of road-bed (cost), 5 acres grubbing at \$10 .....	\$50 00
Gravel, 5,420 cubic yards, at 64 cents; total .....	3,468 80
Earth excavation, 9,039 cubic yards, at 20 cents; total .....	1,807 80
Supervisor's salary .....	294 00
Engineering expenses .....	266 33
<b>Total .....</b>	<b>\$5,886 93</b>

Lump sum, contract price .....	5,326 60
Total allowed by the State .....	5,326 60
One-third of above, amount paid by the State .....	1,775 53

Maximum grade before ..... 3. per cent.  
Maximum grade after ..... 1.4 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 9 and 3 1-3 inches.

Respectfully yours,

I. H. CRAMER,

Engineer.

SAMUEL L. JOHNSON,

Supervisor.

## ELEVENTH ANNUAL REPORT.

TUCKERTON, October 27th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Union Township Shore road, Township of Union, County of Ocean, State of New Jersey. Total length, 17,153 feet, or 3.25 miles.

Width of gravel-bed, 16 feet.

Length of gravel-bed, 17,153 feet.

Depth of gravel-bed, 9 and 3 inches.

Preparation of road-bed, (cost), grubbing 11.81 acres at \$10 ..	\$118 10
Gravel, 7,638.21 square yards, at 112 cents; total .....	8,554 79
Earth excavation, 10,419.31 cubic yards, at 24 cents; total ...	2,500 63
Engineering expenses, 5 % of lump sum .....	558 68
<b>Total .....</b>	<b>\$11,732 20</b>

Lump sum, contract price, .....	\$11,173 52
Total allowed by the State .....	11,173 52
One-third of above, amount paid by the State .....	3,724 51

Maximum grade before .....	2.9 per cent.
Maximum grade after .....	1. per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 9 and 3 inches, 24 ft. wide. Much of the old road bed was left undisturbed and the unevenness was corrected as far as possible in gravelling. The quantity of gravel was delivered, as ascertained by faithful supervision during the building of the road.

Respectfully yours,

THEOS. P. PRICE,  
Engineer.  
EDW. H. RUSSELL,  
Supervisor.

TUCKERTON, N. J., October 27th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detail statement of the cost of the Ocean Township Shore road, Township of Ocean, County of Ocean, State of New Jersey. Total length, 16,977 feet, or 3.22 miles.

Width of gravel-bed, 24 feet.

Length of gravel-bed, 16,977 feet.

Depth of gravel-bed, 9 and 3 inches.

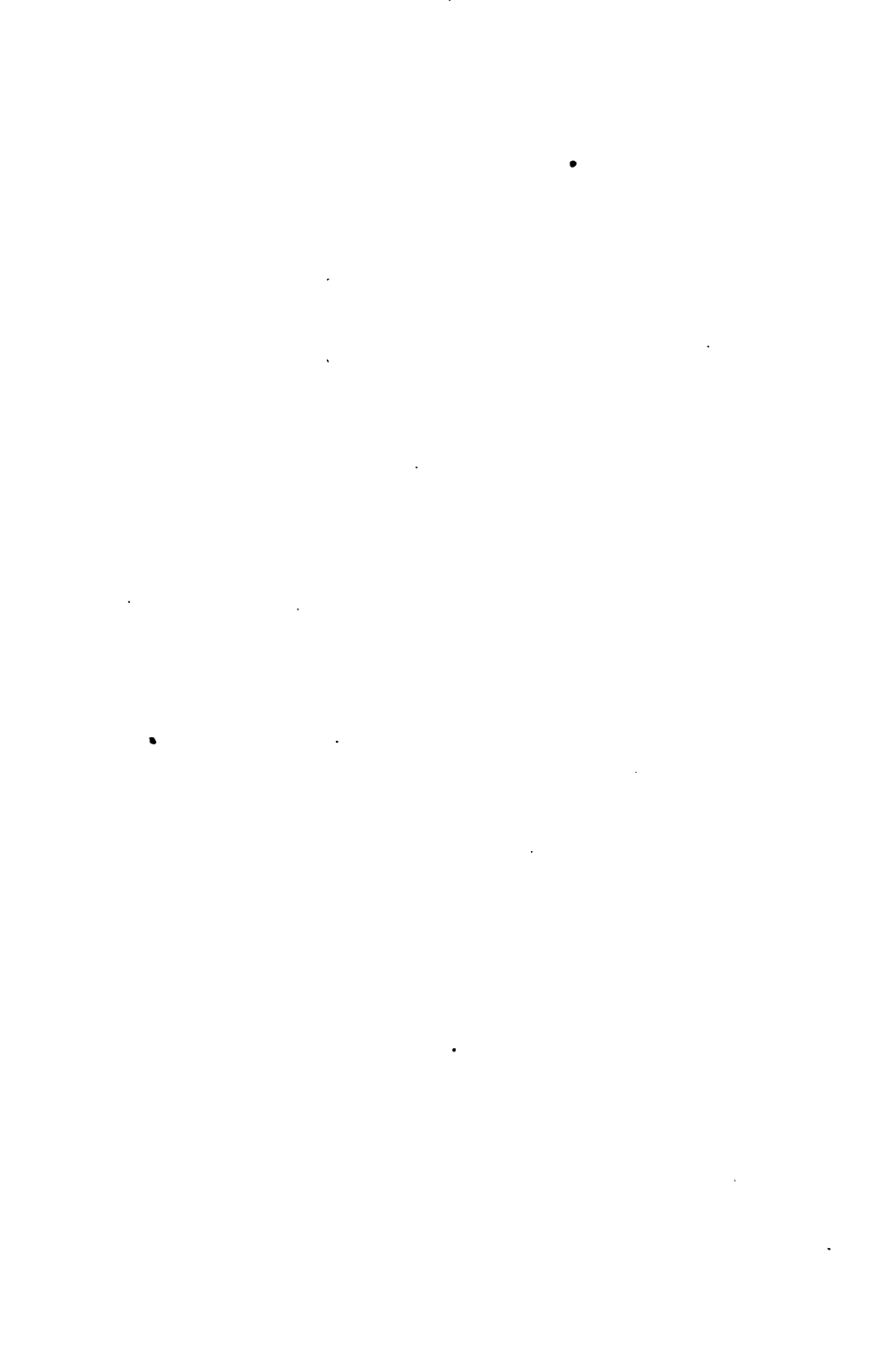
Preparation of road-bed (cost), grubbing 11.69 acres at \$10 ..	\$116 90
Gravel, 7,545 1-3 square yards, at 150 cents; total .....	11,318 00
Earth excavation, 8,151 cubic yards, at 19 cents; total .....	1,548 69
<b>Total .....</b>	<b>\$12,983 59</b>

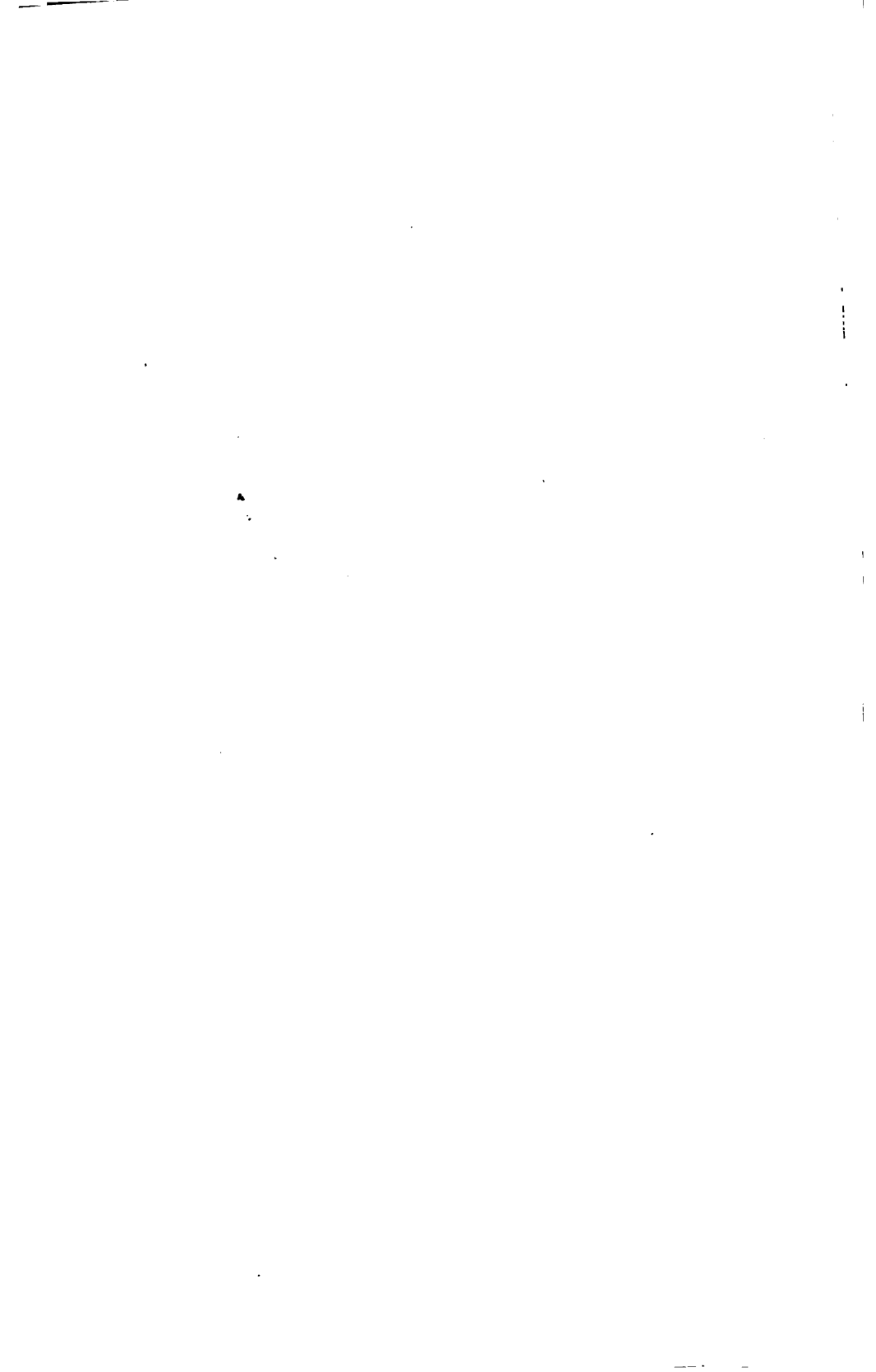


**Union Township Road, Ocean County, 1904  
Before Improvement**



**Union Township Road, Ocean County, 1904  
After Improvement**







Ocean Township Main Shore Road, Ocean County  
Before Improvement.



Ocean Township Main Shore Road, Ocean County  
After Improvement.

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Maca  
Trees  
Top of  
Earth  
Rock  
Drain  
Paving  
Superv



# COMMISSIONER OF PUBLIC ROADS.

113

Deduct rebate to State and County made on condition of transfer to nearer gravel pit .....	1,093 00
	<hr/>
Supervisor's salary .....	\$11,890 59
Engineering expenses, 5% of lump sum .....	549 00
	<hr/>
Total .....	\$13,151 02
	<hr/>
Lump-sum, contract-price .....	\$11,890 59
Total allowed by the State .....	11,890 59
One-third of above, amount paid by the State .....	3,963 53
	<hr/>
Maximum grade before .....	4.2 per cent.
Maximum grade after .....	1.4 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 9 and 3 inches, 24 feet wide. Much of the old road bed was undisturbed, and the unevenness was corrected as far as possible in graveelling. The contract was faithfully carried out to the best of our knowledge and belief founded on careful supervision.

Respectfully yours,

THEOS. P. PRICE,  
Engineer.  
HARRY S. BROWN,  
Supervisor.

November 1st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Squirrel Wood's road, Township of Little Falls, County of Passaic, of State New Jersey. Total Length, 3,177 feet, or .60 mile.

Width of stone-bed, 16 feet.

Length of stone-bed, 3,177 feet.

Depth of stone bed, 4 inches.

Number of tons of stone used in construction, 1,032.

Macadam, 5,474 square yards, at 35 cents; total .....	\$1,915 90
Trees, 6, at 4.00; total .....	24 00
Top dressing road .....	60 00
Earth excavation, 5,375 cubic yards, at 35 cents; total .....	1,881 25
Rock excavation, 613 cubic yards, at 2.25; total .....	1,379 25
Drain, 190 lineal feet, at 3.25; total .....	617 50
Paving, 90.3 square yards, at 60 cents; total .....	54 18
Supervisor's salary .....	411 00
	<hr/>
Total .....	\$6,343 08

Lump sum, contract price .....	\$9,572 50
Total allowed by the State .....	5,877 90
One-third of above, amount paid by the State .....	1,959 30

Maximum grade before .....	13 per cent.
Maximum grade after .....	4.69 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 4 inches.

Respectfully yours,

W. L. WHITMORE,  
Engineer.  
JAMES C. STANLEY,  
Supervisor.

November 1st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of Barbour Street, Township of Manchester, County of Passaic, State of New Jersey. Total length, 2,317 feet, or .44 mile.

Width of stone-bed, 16 feet.  
Length of stone-bed, 2,317 feet.  
Depth of stone-bed, 4 inches.  
Number of tons of stone used in construction, 748.

Macadam, 3,970 square yards, at 35 cents; total .....	\$1,389 50
Telford, 311 square yards, at 25 cents; total .....	77 75
Stone Drain, 600 lineal feet, at 30 cents; total .....	180 00
Retaining wall and catch basin, .....	40 00
Earth excavation, 2,812 cubic yards, at 30 cents; total .....	843 60
Paving, 572.2 square yards, at 60 cents; total .....	343 32
Drain, 15 in., 48 lineal feet, at 100 cents; total .....	48 00
Drain, 18 in., C. I., 98 lineal feet, at 300 cents; total .....	294 00
Supervisor's salary .....	216 00
Total .....	\$3,422 17
Lump sum, contract price, .....	\$2,622 50
Total allowed by the State .....	2,490 85
One-third of above, amount paid by the State .....	830 26

Maximum grade before .....	8.4 per cent.
Maximum grade after .....	4.04 per cent.

We hereby certify the above statement to be correct, and that the pave-

# COMMISSIONER OF PUBLIC ROADS.

115

ment was constructed strictly according to the specifications, and that the depth of finished pavement was 4 inches.

Respectfully yours,

W. L. WHITMORE,

Engineer.

GUSTAV FEIDDLER,

Supervisor.

November 1st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON, NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of East Thirtieth Street, City of Paterson, County of Passaic, State of New Jersey. Total length, 2,868.5 feet, or .50 mile.

Width of stone-bed, 28 feet.

Length of stone-bed, 2,868.5 feet.

Depth of stone-bed, 4 inches.

Macadam, 7,368.6 square yards, at 35 cents; total.....	\$2,579 01
Earth excavation, 531 cubic yards, at 35 cents; total.....	185 85
Engineering expenses.....	81 00

Total.....	\$2,845 86
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Lump sum, contract price.....	\$3,010 00
Total allowed by the State,.....	2,764 86
One-third of above, amount paid by the State.....	921 62

Maximum grade before	} unchanged.
Maximum grade after	

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 4 inches.

Respectfully yours,

W. L. WHITMORE,

Engineer.

SALEM, N. J., November 9th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON, NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Salem and Pennsville road, Township of Lower Penns Neck, County of Salem, State of New Jersey. Total length, 30,993 feet, or 5.87 miles.

Width of shell-bed, 10 and 17 feet.

Length of shell-bed, 30,993 feet.

Depth of shell-bed, 12 and 8 inches.

Number of bushels of shells used in construction, 308,700 as furnished by Board of Freeholders.

Cost of shells as furnished by Board of Freeholders.....	\$16,338 08
Contract for labor,.....	14,025 46
Extra haul on shells, 975 square yards, at 12½ cents; total ..	121 88
Earth excavation, extra 4,270 cubic yards, at 90 cents; total..	3,843 00
Supervisor's salary .....	390 00
Engineering expenses, 1901 to 1904.....	752 31

Total.....	<u>\$35,470 73</u>
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Lump sum, contract price .....	\$14,025 46
Total allowed by the State .....	34,328 02
One-third of above, amount paid by the state.....	11,442 67

Maximum grade before .....	5.40 per cent.
Maximum grade after .....	1.17 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 and 12 inches, ascertained by measurement as laid down.

Respectfully yours,  
JOSIAH MILLER,

Engineer.  
JOS. B. CRISPIN,  
Supervisor.

SALEM, N. J., November 9th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of Part One, of the Woodstown State Aid Road, Borough of Woodstown, County of Salem, State of New Jersey. Total length, 6,043 feet, or 1.144 miles.

Width of stone-bed, 24 feet.  
Length of stone-bed, 6,043 feet.  
Depth of stone-bed, 6 inches plus 2 in. bitulithic surface.  
Number of tons of stone used in construction, over 6,500.

Preparation of road-bed (cost).....	\$13,697 00
Warren's Bitulithic macadam, 16,114 2-3 square yards, at 140 cents; total.....	\$22,561 75
Supervisor's salary .....	154 50
Engineering expenses.....	291 80

Total.....	<u>\$36,705 05</u>
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# COMMISSIONER OF PUBLIC ROADS.

117

Lump sum, contract price .....	\$36,258 75
Total allowed by the State .....	16,114 67
One-third of above, amount paid by the State .....	5,373 56

Maximum grade before .....	3.00 per cent.
Maximum grade after .....	1.80 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 7 inches, which must be and was ascertained by plugging not less than every five hundred feet and measuring from the surface of the earth foundation to a line stretched from the top of the grade stakes.

Respectfully yours,

J. OAKFORD ACTON,  
Engineer.

W. H. REEVES,  
Supervisor.

SALEM, N. J., November 9th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find exact detailed statement of the cost of Part 2 of the Woodstown State Aid road, Borough of Woodstown, County of Salem, State of New Jersey. Total length, 2,443 feet, or .463 miles.

Width of gravel-bed, 14 feet.

Length of gravel-bed, 2,443 feet.

Gravel 3,800 square yards, at 32.58 cents; total .....	\$1,239 19
Supervisor's salary .....	48 00
Engineering expenses .....	22 30
Total .....	<u>\$1,309 49</u>

Lump sum, contract price .....	\$1,239 19
Total allowed by the State .....	1,239 19
One-third of above, amount paid by the State .....	413 06

Maximum grade before .....	.5 of one per cent.
Maximum grade after .....	.5 of one per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was over 10½ inches, which must be and was ascertained by plugging not less than every five hundred feet, and measuring from the surface of the earth foundation to a line stretched across the road.

Respectfully yours,

J. OAKFORD ACTON,  
Engineer.

W. H. REEVES,  
Supervisor.

## ELEVENTH ANNUAL REPORT.

SOMERVILLE, N. J., November 11th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Inter County road, Township of Franklin, Counties of Somerset and Middlesex, State of New Jersey. Total length, 6,700 feet, or 1.27 miles.

Width of stone-bed, 12 feet.  
Length of stone-bed, 6,700 feet.  
Depth of stone-bed, 8 inches.  
Number of tons of stone used in construction, 3,280.

Macadam, 8,934 square yards, at 66.074 cents; total . . . . .	\$5,903 05
Earth excavation, 3,720 cubic yards, at 29 cents; total . . . . .	1,078 80
Drain, 4,000 lineal feet, at 11 cents; total . . . . .	440 00
Supervisor's salary . . . . .	234 00
Engineering expenses . . . . .	760 33

Total . . . . .	<u>\$8,416 21</u>
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Lump sum, contract price . . . . .	\$7,446 92
Total allowed by the State . . . . .	7,421 88
One-third of above, amount paid by the State . . . . .	2,473 96

Maximum grade before . . . . .	8.50 per cent.
Maximum grade after . . . . .	4. per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JOSHUA DOUGHTY, JR.,  
Engineer.R. J. DOUGHERTY,  
Engineer, Middlesex.GEORGE A. WOOLF,  
Supervisor.

SOMERVILLE, N. J., 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Peapack road, Townships of Bernard and Bedminster, County of Somerset, State of New Jersey. Total length, 22,250 feet, or 4.20 miles.

Width of stone-bed, 12 and 14 feet.  
Length of stone-bed, 22,250 feet.  
Depth of stone-bed, 8 inches.

# COMMISSIONER OF PUBLIC ROADS.

119

Macadam, 31,564 square yards, at 56 cents; total.....	\$17,675 84
Earth excavation, 15,291 cubic yards, at 23 cents; total.....	3,516 93
Drain, 8,000 lineal feet, at 14 cents; total.....	1,120 00
Supervisor's salary.....	453 00
Engineering expenses.....	1,185 00

Total.....	<u>\$23,950 77</u>
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Lump sum, contract price.....	\$22,809 21
Total allowed by the State.....	22,312 77
One-third of above, amount paid by the State.....	7,437 59

Maximum grade before.....	13 per cent.
Maximum grade after.....	6.76 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JOSHUA DOUGHTY, JR.,  
Engineer.

F. H. LUDLOW,  
Supervisor.

SOMERVILLE, September 3rd, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Mountain avenue road, Township of Bridgewater, County of Somerset, State of New Jersey. Total length, 7,300 feet, or 1.38 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 7,300 feet.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 5,000.

Macadam, 11,337 square yards, at 52 cents; total.....	\$5,895 24
Changing course of brook and building wall.....	110 00
Earth excavation, 5,027 cubic yards, at 35 cents; total.....	1,759 45
Drain, 2,700 lineal feet, at 15 cents; total.....	405 00
Supervisor's salary.....	336 00
Engineering expenses.....	344 32

Total.....	<u>\$8,850 01</u>
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Lump sum, contract price.....	\$7,435 00
Total allowed by the State.....	8,169 69
One-third of above, amount paid by the State.....	2,723 23

Maximum grade before..	9 per cent.
Maximum grade after.....	7½ per cent.

## ELEVENTH ANNUAL REPORT.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JOSHUA DOUGHTY, JR.,

Engineer.

PETER H. SMITH,

Supervisor.

September 13th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Davidson's Bridge road, Township of Bernards, County of Somerset, State of New Jersey. Total length, 16,900 feet, or 3.20 miles.

Width of stone-bed, 12 and 14 feet.

Length of stone-bed, 16,900 feet.

Depth of stone-bed, 8 and 12 inches.

Number of tons of tone used in construction, 9,000.

Macadam, 16,323 square yards, at 54 cents; total.....	\$8,814 42
Telford, 7,300 square yards, at 66 cents; total.....	4,818 00
Extra stone .....	40 50
Earth excavation, 8,165 cubic yards, at 25 cents; total .....	2,041 25
Binder, 500 cubic yards, at 35 cents; total .....	175 00
Drain, 7,500 lineal feet, at 14 cents; total .....	1,050 00
Supervisor's salary .....	352 20
Engineering expenses.....	738 83
Total.....	<hr/> \$18,030 20 <hr/>
Lump sum, contract price .....	\$17,753 43
Total allowed by the State .....	16,939 17
One-third of above, amount paid by the State .....	5,646 39

Maximum grade before .....	10 per cent.
Maximum grade after.....	7.25 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 and 10 inches.

Respectfully yours,

JOSHUA DOUGHTY, JR.,

Engineer.

L. H. BOWEN,

Supervisor.







**Tuttle's Cornor Road, Sussex County  
Before Improvement**



**Tuttle's Cornor Road, Sussex County  
After Improvement**

# COMMISSIONER OF PUBLIC ROADS.

127

NEWTON, N. J., October 25th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the  
Tuttle's Corner road, Township of Sandyston, County of Sussex, State of  
New Jersey. Total length, 8,948 feet, or 1.695 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 8,948 feet.

Depth of stone-bed, 7 inches.

Number of tons of stone used in construction; no record kept. Native  
stone used.

Preparation of road-bed (cost).....	\$5,569 74
Macadam, 13,919 .11 square yards, at 56 cents; total.....	7,794 70
Earth excavation, 12,148 cubic yards, at 29 cents; total.....	3,522 92
Rock excavation, 430 cubic yards, at 100 cents; total.....	430 00
Drain, 53 lineal feet, of 24 in. W. I. pipe, at 2.90; total.....	153 70
Drain, 26 lineal feet of 18 in W. I. pipe, at 2.15; total.....	55 90
Drain, 564½ lineal feet of 12 in W. I. pipe, at 1.35; total.....	762 07
Drain, 2,091 lineal feet of 4 in. Tile, at 15 cents; total.....	313 65
70 load crushed stone covering on tile.....	122 50
880 lineal feet of stone drain, at 15 cents; total.....	132 00
Retaining wall, 34 2-9 yards, at 2.25; total.....	77 00
Supervisor's salary.....	480 00
Engineering expenses.....	378 68

Total.....	<u>\$14,223 12</u>
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Lump sum, contract price.....	\$12,282 00
Total allowed by the State.....	13,315 17
One-third of above, amount paid by the State.....	4,105 06

Maximum grade before, of old road . . . . . 11.5 per cent, as it still remains.  
Maximum grade after, of entire new road . . . . . 5.4 per cent.

We hereby certify the above statement to be correct, and that the pave-  
ment was constructed strictly according to the specifications, and that the  
depth of finished pavement was full 7 inches.

Respectfully yours,

A. H. KONKLE,

Engineer.

THEODORE W. CRANE,

Supervisor.

CRANFORD, N. J., October 19th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of Cen-  
tennial avenue, Township of Cranford, County of Union, State of New Jersey.  
Total length, 3,300 feet, or .63 mile.

## ELEVENTH ANNUAL REPORT.

Width of stone-bed, 12 feet.  
 Length of stone-bed, 3,300 feet.  
 Depth of stone-bed, 6 inches.

Macadam, 4,467 square yards, at 59 cents; total.....	\$2,635 53
7 tons of 1½ in. stone, additional at a rebuilt culvert, to take up the depression in the roadway, placed on the 6 in. work, with binder, screenings, etc., and rolled, at \$1.20 total..	8 40
Earth excavation, 2,142 cubic yards, at 32 cents; total.....	685 44
6 manhole heads reset, at 3.00; total.....	18 00
Total.....	<hr/> \$3,347 37
Above total, less the additional crushed stone, \$8.40, equals	3,338 97
Total allowed by the State.....	3,320 97
One-third of above, amount paid by the State,.....	1,106 99
Maximum grade before.....	4.50 per cent.
Maximum grade after.....	4.15 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

J. L. BAUER,

Engineer.

J.,

Supervisor.

The above item of \$8.40, was made necessary by reason of the change of a culvert, after the work had been done, and was done in order to prevent a sinkhole depression at that point.

J. L. BAUER.

DANVILLE, N. J., October 18th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
 NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of Danville road, Second Section, Township of Independence, County of Warren, State of New Jersey. Total length, 19,429.5 feet, or 3.67 miles.

Width of stone-bed, 14,473 feet, 12 feet wide, 4,895 feet, 16 feet wide.  
 Length of stone-bed, 19,368 feet.  
 Depth of stone-bed, 8 inches, loose stone.

Macadam, 25,184 8-9 square yards, at 48 cents; total.....	\$12,088 75
Macadam, 2,814 2-3 square yards, at 30 cents; total.....	844 40
Earth excavation, 12,907 cubic yards, at 23 cents; total.....	2,968 61
Rock excavation, 94 cubic yards, at \$1.00; total.....	94 00
Drain Pipe, 80 lineal feet, 20-in. tile pipe at \$1.80; 384 lineal ..	
feet, 15-in. tile pipe, at \$1.30; 267 lineal feet, 12-in. tile	
pipe at \$1.10; 24 lineal feet, 12-in. iron pipe, at \$1.70; total	972 50

# COMMISSIONER OF PUBLIC ROADS.

123

Drain, stone 1,134 lineal feet, at 15 cents; total, . . . . .	170 10
Cobble gutter, 84 66-100 square yards, at 40 cents; total . . . .	33 86
Supervisor's salary . . . . .	409 50
Engineering expenses. . . . .	150 00

Total. . . . .	<u>\$17,731 72</u>
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Lump sum, contract price . . . . .	\$15,995 76
Total allowed by the State . . . . .	15,995 76
One-third of above, amount paid by the State . . . . .	5,331 92

Maximum grade before . . . . .	15.50 per cent.
Maximum grade after. . . . .	6.66 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6½ inches.

Respectfully yours,

S. W. SALMON,

Engineer.

JOHN MERRELL,

Supervisor.

STEWARTSVILLE, N. J., October 22nd, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Stewartsville road, Second Section, Township of Greenwich, County of Warren, State of New Jersey. Total length, 12,880 feet, or 2.44 miles.

Widths of stone-bed, 404 feet, average width 27.9 feet; 2,055 feet, 14 feet; 10,362 feet, 12 feet.

Length of stone-bed, 12,821 feet.

Depth of stone-bed, 8 inches loose stone.

Number of tons of stone used in construction, 6,040.

Macadam, 18,263.7 square yards, at 57 cents; total. . . . .	\$10,410 31
Earth excavation, 8,200 cubic yards, at 27 cents; total . . . .	2,214 00
Rock excavation, 386 cubic yards, at \$2.00; total . . . . .	772 00
Drain pipe, 416 lineal feet, 15-in. tile pipe, at \$1.30; 94 lineal feet, 12-in. tile pipe, at \$1.10; 28 lineal feet, 8-in. tile pipe, at 65 cents; 30 lineal feet, 3-in. tile pipe, at 20 cents; total. . . . .	668 40
Drain, stone, 351½ lineal feet, at 25 cents; total . . . . .	87 87
Extra, laying pipes. . . . .	24 53
Supervisor's salary. . . . .	168 00
Engineering expenses. . . . .	150 00

Total. . . . .	<u>\$14,395 11</u>
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Lump sum, contract price . . . . .	\$13,484 18
Total allowed by the State . . . . .	13,484 18
One-third of above, amount paid by the State . . . . .	4,494 73
Maximum grade before . . . . .	10 per cent.
Maximum grade after . . . . .	6.2 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 7 inches.

Respectfully yours,

S. W. SALMON,  
Engineer.

SAMUEL S. STEWART,  
Supervisor.

STEWARTSVILLE, N. J., November 1st, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the Morris Turnpike road, Township of Lopatcong, County of Warren, State of New Jersey. Total length, 13,660 feet, or 2.59 miles.

Width of stone bed, 14 feet.

Length of stone-bed, 13,590 feet.

Depth of stone-bed, 8 inches, loose stone.

Number of tons of stone used in construction, 7,222.

Macadam, 21,140 square yards, at 52 cents; total . . . . .	\$10,992 80
Earth excavation, 16,887 cubic yards, at 25 cents; total . . . . .	4,221 75
Rock excavation, 3,758 cubic yards, at \$1.25; total . . . . .	4,697 50
Drain pipe, 778 lineal feet, 15-in. tile pipe, at \$1.25; 98 lineal feet, 24-in. tile pipe, . . . . . 24 lin. feet 24-in. cast iron pipe; total . . . . .	1,263 80
Drain, stone, 9,237 lineal feet, at 30 cents; total . . . . .	2,771 10
Retaining wall, 398 cubic yards, at \$1.60; total . . . . .	636 80
Supervisor's salary . . . . .	271 50
Engineering expenses . . . . .	279 00
Total . . . . .	<u>\$25,134 25</u>

Lump sum, contract price . . . . .	\$22,683 15
Total allowed by the State . . . . .	22,683 15
One-third of above, amount paid by the State . . . . .	7,561 05
Maximum grade before . . . . .	12.4 per cent.
Maximum grade after . . . . .	6' per cent.

We hereby certify the above statement to be correct, and that the pave-



**Slight's Corner, looking westward towards Tinsman's Hill, Morris Turnpike,  
Lopatcong Township, Warren County  
Before Improvement**



**Slight's Corner. looking westward towards Tinsman's Hill, Morris Turnpike,  
Lopatcong Township, Warren County—After Improvement**











PHILLIPSBURG, N. J., October 24th, 1904.

MR. HENRY I. BUDD, STATE COMMISSIONER OF PUBLIC ROADS, TRENTON,  
NEW JERSEY:

DEAR SIR—Below find an exact detailed statement of the cost of the New Brunswick Turnpike road, Township of Pohatcong, County of Warren, State of New Jersey. Total length, 7,384 feet, or 1.38 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 7,349 feet.

Depth of stone-bed, 8 inches, loose stone.

Number of tons of stone used in construction, 3,850.

Macadam, 11,431 7-9 square yards, at 57 cents; total .....	\$6,516 11
Earth excavation, 5,365 cubic yards, at 25 cents; total .....	1,341 25
Rock excavation, 53 cubic yards, at \$1.00; total .....	53 00
Drain pipes, 5-126 lineal feet, 20-in. tile pipe, at \$1.60; 60 lineal feet, 15-in. tile pipe, at \$1.25; 44 lineal feet, 12-in. cast iron pipe, at \$1.40; 12 lineal feet, 20-in. cast iron pipe, at \$2.25; total .....	365 20
Drain, stone, 8,310 lineal feet, at 35 cents; total .....	2,908 50
Supervisor's salary .....	112 50
Engineering expenses .....	113 00
.....	<hr/>
Total .....	\$11,409 56
Lump sum, contract price .....	\$10,818 86
Total allowed by the State .....	10,818 86
One-third of above, amount paid by the State, .....	3,606 28
Maximum grade before .....	6.2 per cent.
Maximum grade after .....	4.6 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 7 inches.

Respectfully yours,

S. W. SALMON,

Engineer.

SAMUEL S. STEWART,

Supervisor.

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## APPENDICES.

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(127)

3. Any variation of location, profile, size and dimensions from that shown on the plans, as may be required by the exigencies of construction, will, in all cases, be determined by the Engineer; but the contractor shall not, on any pretense, save that of the written order of the contracting parties, deviate from the intent of the plans or specifications.

4. On all drawings, figured dimensions are to govern in cases of discrepancy between scale and figures.

#### GRADING.

5. Under this head will be included all excavation and embankment required for the formation of the highway; cutting all ditches or drains about or contiguous to the road; removing all fences, walls, buildings, trees, poles or other encumbrances; the excavation and embankment necessary for reconstructing cross or branch roads in cases where they are destroyed or interfered with in the formation of the roadway, and all other excavations and embankments connected with or incidental to the construction of the said road.

#### EXCAVATION.

6. The roadway to the width of.....feet as shown on plan must be excavated or built to the same curvature as that of the surface of the road when finished; the grade, from center to sides, must be as shown on plans.

7. The earth taken from any cut or ditch shall be deposited where the Engineer may direct, either within or without the line of the road, but no earth shall be removed from the line of the road without the order of the Engineer.

8. The grading shall be completed for the full width of the road, from gutter to gutter, before any macadamizing is commenced.

#### EMBANKMENT.

9. Material taken from the excavations, except when otherwise directed by the Engineer, shall be deposited in the embankments, either on the roadway or sidewalks. Rejected or excess material will be used to increase the width of the embankments or deposited in spoil banks or waste piles, as and where the Engineer may direct.

10. When there is not sufficient material in the excavations of the road to form the embankments, the deficiency must be supplied by the contractor from without the road. The character of said material and place of excavation must be approved by the Engineer. Said material is to be paid for at the same price per cubic yard as specified in the contract for other excavation.

11. The embankments will be formed in layers of such depth, generally one (1) foot, and the material deposited and distributed in such a manner as the Engineer may direct, the required allowance for settling being added

#### SLOPES.

12. Slopes in both embankments and excavations shall be one and one-half ( $1\frac{1}{2}$ ) horizontal to one (1) vertical, unless otherwise ordered by the Engineer.

## ROADWAY.

## SUB-FOUNDATIONS.

13. When the excavations and embankments have been brought to a proper depth below the intended surface of the roadway, and the cross-section thereof, conforming in every respect to the cross-section of the road when finished, the same shall be rolled with a.....ton steam roller until approved by the Engineer and Supervisor. If any depressions form under such rolling, owing to improper material or vegetable matter, the same shall be removed and good earth substituted, and the whole re-rolled until thoroughly solid and to above-mentioned grade. Water must be applied in advance of the roller when, in the opinion of the Engineer and Supervisor, it is necessary.

## STONE CONSTRUCTION.

## TELFORD FOUNDATIONS.

14. After the road-bed has been formed and rolled, as above specified and has passed the inspection of the Engineer and Supervisor, a bottom course of stone, of an average depth of.....inches, is to be set by hand as a close, firm pavement, the stones to be placed on their broadest edges lengthwise across the road in such manner as to break joints as much as possible, the breadth of the upper edge not to exceed four (4) inches. The interstices are then to be filled with stone chips, firmly wedged by hand with a hammer, and projecting points broken off. No stone of greater length than ten (10) inches or width of four (4) inches shall be used, except each alternate stone on outer edge, which shall be double the length of the others and well tied into the bed of the road; all stones with a flat, smooth surface must be broken; the whole surface of this pavement to be subjected to a thorough settling or ramming with heavy sledge-hammers, and thoroughly rolled with a.....ton.....roller. No stone larger than two and one-half ( $2\frac{1}{2}$ ) inches to be left loose on top of telford.

## MACADAM.

## FIRST COURSE OF BROKEN STONE.

15. After the road-bed has been formed and rolled as above specified and has passed the inspection of the Engineer and Supervisor, the first layer of broken stone, consisting of two and one-half ( $2\frac{1}{2}$ ) inch stone, or stone that will pass through a ring three (3) inches in diameter, shall be deposited in a uniform layer, having a depth of.....inches, and rolled repeatedly with a.....ton.....roller until compacted to the satisfaction of the Engineer and Supervisor. No stone in this course shall be less than two (2) inches in length. Water must be applied in advance of the roller when, in the opinion of the Engineer, it is necessary.

16. The depth of loose stone in this and all other courses must be measured by blocks the required thickness of the said loose stone. These blocks to be placed at frequent intervals amid the loose stone when being spread.

### BINDER BETWEEN FIRST AND SECOND COURSE FOR TELFORD OR MACADAM.

17. On the first course of stone a quantity of ..... binder shall be spread in a uniform layer, and the rolling continued until the stones cease to sink or creep in front of the roller; water will be applied in advance of the roller, if ordered by the Engineer. The quantity and quality of this and all other binding to be at all times subject to the approval of the Engineer and Supervisor.

### SECOND COURSE OF BROKEN STONE FOR MACADAM OR TELFORD.

18. The second course of broken stone shall consist of one and one-half ( $1\frac{1}{2}$ ) inch stone; that is, every piece of stone shall be broken so that it can be passed through a ring two (2) inches in diameter, and no stone shall be more than two (2) inches or less than one (1) inch long. This course is to be spread in a uniform layer of ..... inches in depth and rolled until thoroughly settled into place to the satisfaction of the Engineer and Supervisor. Water will be applied if ordered by the Engineer and Supervisor.

### \*BINDER ON SECOND COURSE OF STONE.

19. Binder on this course of stone must be applied in the same manner as binder on first course of stone (see Art. 17), as directed by Engineer and Supervisor.

### SURFACE.

20. When the two courses are rolled to the satisfaction of the Engineer and Supervisor, a coat of fifty (50) per cent. of three-quarters ( $\frac{3}{4}$ ) inch stone and fifty (50) per cent. of screenings, properly mixed, is to be spread of sufficient thickness to make a smooth and uniform surface to the road; then again rolled until the road becomes thoroughly consolidated, hard and smooth.

21. Rolling to be done by contractor with ..... ton ..... roller, approved by the Engineer.

22. Any depressions formed during the rolling, or from any other cause, are to be filled with one and one-half ( $1\frac{1}{2}$ ) inch stone or three-quarter ( $\frac{3}{4}$ ) inch stone or both, and screenings, approved by the Engineer, and the roadway brought to the proper grade and curvature as determined by him.

23. Water must be applied in such quantities and in such manner as directed by the Engineer and Supervisor.

### MANNER OF ROLLING.

24. In the rolling the roller must start from the side lines of the stone bed and work towards the center, unless otherwise directed. The rolling shall at all times be subject to the directions of the Engineer and Supervisor, who may, from time to time, direct such methods of procedure as in their opinion the necessities of the case may require.



## QUALITY OF MATERIAL.

25. All stone must be as nearly cubical as possible, broken with the most approved modern stone-crushing machinery, free from all screenings, earth and other objectionable substances, of uniform size and the same kind and quality, or equally as good in every particular as that shown in the Engineer's office. The one and one-half ( $1\frac{1}{2}$ ) inch stone, three-quarter ( $\frac{3}{4}$ ) inch and screenings for binder and final finish must be of the best trap-rock, free from loam or clay.

26. The contractor must furnish samples to the Engineer of the kind of stone to be used in the work before the opening of the bids.

## SHOULDERING.

27. A shoulder of firm earth or gravel is to be left or made on each side, extending at the same grade and curvature of road to side ditches or gutters. This shoulder is to be rolled according to the directions of the Engineer.

## SIDE DITCHES OR GUTTERS.

28. The side ditches or gutters are to be excavated as per stakes furnished by Engineer, in order to give an easy flow of water, so that no water shall be left standing on the road or in the ditches, for all of which no extra payment will be made.

## UNDER-DRAINS.

29. Under-drains, if found necessary, shall be constructed by the contractor (at prices named in bids) of good.....inch tile, laid upon a board of not less than one (1) inch in thickness and six (6) inches in width, whenever and wherever the Engineer and Supervisor shall decide; top of tile to be at least.....inches deep, unless otherwise directed by the Engineer, the joints of the tile to be covered with salt hay or material equally as good, and trench filled with pervious earth.

30. When directed by the Engineer a stone drain may be used in place of the tile drain. A trench one foot wide and one foot six inches in depth shall be excavated below the sub-grade, said excavation to be filled with loose broken stone to a depth required by the Engineer.

## NO EXTRA PRICE.

31. No allowance in measure of depth of pavement will be made on account of any material which may be driven into the road-bed by rolling. The pavement when completed must conform to the grade and the cross-sections, and be satisfactory to the Engineer, whose decision shall be final.

32. No extra work will be paid for unless the price has been agreed upon between the contracting parties, including the State Commissioner of Public Roads, and endorsed upon the agreement, witnessed by the Engineer.

33. All clay or gravel for shouldering or binder and all extra hauling is to be done at the contractor's expense.

## ELEVENTH ANNUAL REPORT.

## BROAD TIRE WAGONS.

34. All wagons and carts used during the construction for hauling stone, earth or any other material must have tires not less than three and one-half ( $3\frac{1}{2}$ ) inches in width.

## BIDS.

35. Bids will only be received under these specifications for the road complete. The prices per yard for excavation, telford, macadam, &c., are intended for the use of the Engineer in making estimate to the Board of Chosen Freeholders of work done. No bids will be received in which all of the following items are not filled out:

- (1) Price per cubic yard for earth excavations, without classification, as per cross-sections throughout the length and width of the road.
- (2) .....
- (3) Price per square yard for telford road complete.
- (4) Price per square yard for macadam road complete.
- (5) Price per lineal foot for under-drains, furnishing all labor and material.
- (6) Price (lump) for the whole road complete, according to above specifications and plans.

## ESTIMATE OF QUANTITIES.

36. (1) Excavation, earth. .... cubic yards
- (2) .....
- (3) Telford ..... square yards, as specified
- (4) Macadam ..... square yards, as specified
- (5) Under-drains ..... lineal feet
- (6) .....

37. These quantities are the result of calculation, but are to be considered as approximate. The County will not be responsible for any excess in above quantities, should any occur. The contractor is expected to satisfy himself as to the nature, character and quantity of the labor and material required by a personal examination of the work contemplated.

## CHECK ACCOMPANYING BIDS.

38. Bids shall be accompanied with a certified check, payable to the Director of the Board of Chosen Freeholders, for the sum of One Thousand (\$1,000.00) Dollars, as a guarantee that if the contract shall be awarded to him he will, when required by said Board, execute an agreement in writing to perform the work according to the specifications, and upon failure by the contractor to enter into said agreement with the said Board of Chosen Freeholders, said certified check shall be forfeited and considered as liquidated damages.

## LIABILITIES OF CONTRACTOR.

39. He shall maintain sufficient guards by day and night to prevent accidents from travel, and will be liable for any damage which may arise from his neglect to do so, or from any omission on his part.

40. He shall keep the road sprinkled until the final certificate of completion by the Engineer is given.

41. He is to commence and prosecute the work upon the road at such points as may be directed by the Engineer within.....days from and after the signing of the contract, and shall continue work thereon until completion, except as herein provided.

42. He further agrees to complete the same on or before the.....day of.....A. D.....Twenty dollars for each day that the work shall remain uncompleted, after the time allowed by contract, may be deducted, as liquidated damages, from any moneys due contractor, unless otherwise agreed upon by the Board of Chosen Freeholders, after presentation of certificate of the Engineer recommending the extension of the time limit of completion. A bonus or premium of one dollar per week will be paid the contractor for each week the road is completed before the time specified in the contract.

43. The contractor shall keep the finished roadway and earthwork in repair for the period of one year from the date of its completion and acceptance, during which time he shall be liable for wear and tear caused by ordinary travel, and in addition thereto, for as much longer as for any period or periods during said year it shall be out of proper condition. If, during that time, the roadway or any part of the work shall, in the judgment of the Engineer and Board of Chosen Freeholders, require repairing, and they shall duly notify the contractor to make such repairs as required, and the contractor should refuse or neglect to do so to the satisfaction of the said Engineer and Board of Chosen Freeholders, within five days from the date of service of notice, then the said Engineer and Board of Chosen Freeholders shall have the right to have the work done properly by other parties and pay the expense for the same out of the five per cent. retained.

44. The contractor will be required to preserve all stakes and bench-marks made and established on the line of work until duly authorized by the Engineer to remove the same.

45. The contractor shall not disturb the position of title stones (the corners of properties adjacent to the road), but where they appear he will either lift or lower them, under the personal supervision of the Engineer.

46. The contractor must also preserve the roadway on which he is working from needless obstruction, and where necessary, he must construct safe and commodious crossings, to be maintained in good order. He shall afford all proper and reasonable means for the accommodation of the public, and leave the roadway complete in every manner ready for immediate use.

#### PROVISION FOR DRAINAGE.

47. If it is necessary in the prosecution of the work to interrupt or obstruct the natural drainage of the surface, or the flow of artificial drains, the contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interests. He shall be held liable for all damages which may result from any neglect to provide for either natural or artificial drainage, which he may have interrupted.

## RIGHT TO BUILD BRIDGES, CULVERTS, ETC., AND SUSPENSION OF WORK.

48. The right of the county to build bridges, culverts, lay pipes or other appurtenances in said road during the progress of the work is expressly reserved, as well as suspending the work or any part thereof during the construction of the same, for the purposes above stated, without further compensation to the contractor for such suspension than an extension of time for completing the work as much as it may have been delayed.

## STOPPING WORK ON ACCOUNT OF WEATHER.

49. The Engineer or Supervisor may stop any portion of the work if, in their judgment, the weather is such as to prevent the same being done properly. No allowance of any kind will be made for such stoppage, except an extension of the time for the completion of the work as herein provided.

## ABANDONMENT OF CONTRACT.

50. If at any time the work under contract should be abandoned, or if at any time the Engineer should judge and so certify in writing that said work, or any part thereof, is unnecessarily delayed, or that the contractor is wilfully violating any of the conditions or covenants of this contract, or is executing the same in bad faith, then, and in that case, the Board of Chosen Freeholders shall notify the said contractor to discontinue all work under this contract. They may employ other parties to complete the work in such manner as they may decide, and use such material as may be procured upon the line of aforesaid work, and, if necessary, to procure other material for its completion, and charge the expense of the said labor and material to the contractor, which expense shall be deducted from any moneys due him under contract. In case these expenses shall exceed the sum which would have been payable under contract, if the same had been completed by said contractor, he or his bondsmen shall pay the amount of the excess to the Board of Chosen Freeholders, on notice from the Engineer.

## ENGINEER.

51. The Engineer is to be selected or appointed by the Board of Chosen Freeholders and paid by them. He is to furnish all surveys, profiles, plans specifications and estimates of quantities of all kinds before specifications are signed, and in such a clear manner that lump bids can be made upon the work. He shall furnish all lines and grades required for the completion of the work. He is to furnish estimates for quantities of work done before partial payments can be made, the quantity of road laid being determined by surface measurements. Should any difference arise between the contracting parties as to their meanings, his decisions on these matters are to be final and conclusive. The work is to be done according to his directions, and if any material of which he does not approve is brought upon the road, it is to be removed at the expense of the contractor. If the contractor fails or neglects to do any part of the work as specified or as directed by the Engineer, then in that case all other work shall be discontinued on notice from the Engineer to the contractor, or to the superintendent or foreman

in charge of the work for the contractor, until such time as the work complained of has been done to the satisfaction of the Engineer; and the contractor will not be entitled to or allowed any compensation or extension of time for such discontinuation or suspension of the work.

### SUPERVISOR.

52. Nothing in these specifications relating to the duties of the Engineer shall be taken or construed in any manner to conflict with the duties of the Supervisor, as specifically set forth in the act entitled "An act to provide for the permanent improvement of the public roads of this state," approved April 1st, 1903, and the acts supplementary thereto, but they shall co-operate as far as practicable.

### INCOMPETENT WORKMEN.

53. The contractor shall employ competent men to do the work, and whenever the Supervisor shall inform him, or his representative in charge, in writing, that any man on the work is unfitted for the place, or is working contrary to the provisions of the specifications or the instructions of the Engineer and Supervisor, he shall thereupon be discharged.

### INSPECTION.

54. All directions and determinations necessary to give due and full effect to any of the provisions of these specifications shall be given by the Engineer and Supervisor.

55. All material and workmanship of any kind shall be subject at all times to the inspection of the Engineer and Supervisor. Whenever unfaithful and imperfect work is discovered, it shall be immediately repaired or replaced by the contractor, after due notification from the Engineer and Supervisor.

### SUB-LETTING OF CONTRACT.

56. The contractor shall not assign or sub-let any portion of this contract without the consent of the Board of Chosen Freeholders and the State Commissioner of Public Roads.

### PAYMENTS.

57. ....monthly payments will be made by the Board of Chosen Freeholders to the contractor for work performed, upon presentation by him of the proper certificates of the Engineer and Supervisor in a sum not to exceed eighty per cent. of the amount then due, together with releases from all liens, if required. Fifteen per cent. will be paid at the completion of the work. The remainder or five per cent. will be retained by the Board of Chosen Freeholders for a period of one year, as provided for in Article 43.

# ELEVENTH ANNUAL REPORT.

## BOND OF CONTRACTOR.

58. The contractor will be required to execute, within thirty days of giving of contract, a bond in such sum and with such securities as shall be approved by the Board of Chosen Freeholders, conditioned for the faithful performance of the contract, to indemnify and save harmless the said Board of Chosen Freeholders from all suits or actions of any name or description brought against them on account of any act or omission of the contractor or his agents, and for the faithful performance of the contract by the contractor. Said bond shall be in a sum of not less than the estimated cost of the road when completed. Any change made in said plans, specifications, agreements or quantities without the consent of the bondsmen shall in no way vitiate said bond. The said contractor hereby further agrees that so much of the money due him, under and by virtue of this agreement, as shall be considered necessary by the Board of Chosen Freeholders, may be retained by them until all such suits or claims for damages aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the said Board of Chosen Freeholders.

## CONTRACTOR TO INSURE PAYMENT FOR LABOR, MATERIAL, ETC., ON FINAL ESTIMATE.

59. The contractor must also furnish said Engineer and Supervisor with satisfactory evidence that all persons who did work, or furnished material for this contract, or who have sustained damage or injury by reason of any act, omission or carelessness on his part or his agents in the prosecution of the work have been duly paid or secured; he shall also give notice to said Engineer and Supervisor within ten days after the completion of the work, and before final estimate is made, that any balance for such work or materials, or compensation for such damages due, has been fully paid or released.

The right to increase or decrease the quantity of work and to reject any or all bids is reserved.

.....  
COUNTY ENGINEER.

.....  
ROAD COMMITTEE.

Approved this..... A. D.  
 .....by Y resolution of the Board of Chosen Freeholders of the  
 County of.....

.....  
 DIRECTOR OF BOARD OF CHOSEN FREEHOLDERS.

.....  
 CLERK OF BOARD OF CHOSEN FREEHOLDERS.

OFFICE OF STATE COMMISSIONER OF PUBLIC ROADS,  
 TRENTON, N. J.

I have this day carefully read and examined the foregoing specifications,  
 and the same are hereby approved.

Any departure from these specifications which increases the cost of the  
 road must have the written consent of the State Commissioner of Public  
 Roads.

Given under my hand, this ..... A. D.....

.....  
 STATE COMMISSIONER OF PUBLIC ROADS.

## ELEVENTH ANNUAL REPORT.

## PROPOSALS.

TO THE BOARD OF CHOSEN FREEHOLDERS, COUNTY OF .....  
AND STATE OF NEW JERSEY:

GENTLEMEN—The undersigned hereby declare... that... he... ha....  
carefully examined the annexed specifications and the drawings therein  
referred to, and will provide all necessary, machinery, tools, apparatus  
and other means of construction, and do all the work and furnish all the  
material called for by said specifications in the manner prescribed by the  
specifications and the requirements of the Engineer and Supervisor under  
them, for the following prices:

- (1) Price per cubic yard for earth excavations, without classification,  
as per cross-sections throughout the length and width of the road.
- (2) .....
- (3) Price per square yard for telford road complete.
- (4) Price per square yard for macadam road complete.
- (5) Price per lineal foot for under-drains, furnishing all labor and material.
- (6) Price (lump) for the whole road complete, according to above specifica-  
tions and plans.

Accompanying this proposal is a certified check for the sum of one thous-  
and (\$1,000) dollars, payable to the order of the Director of the Board of  
Chosen Freeholders of.....County; which  
check is to be forfeited as liquidated damages if, in case this proposal is  
accepted, the undersigned shall fail to execute a contract with said Board  
of Chosen Freeholders, under the conditions of this proposal, within the  
time provided for by the foregoing advertisement for proposals; otherwise  
said check is to be returned to the undersigned.

Signed .....

Address .....

..... N. J., .....



CONTRACT.

This agreement, made the . . . . . day of . . . . . in the year of our Lord one thousand nine hundred . . . . . between THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF . . . . .

party of the first part, and . . . . . party of the second part.,

~~Witnesseth~~, That the said party of the second part, for and in consideration of the payments hereinafter specified and agreed to be made by the party of the first part, hereby covenant and agree to furnish and deliver all the materials and to do and perform all the work and labor required to be furnished and delivered, done and performed in and about the macadamizing of . . . . . beginning at . . . . .

and extending to . . . . .

in the township of . . . . . a distance of . . . . .

in strict and entire conformity with the plans on file in the engineer's office and with the specifications hereto annexed and duly approved by resolution of THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF . . . . .

adopted the . . . . . day of . . . . .

in the year of our Lord one thousand

nine hundred . . . . . and approved by the State

Commissioner of Public Roads on the . . . . . day of . . . . .

in the year of our Lord one thousand nine hundred . . . . .

which said plans and specifications are hereby made part of this agreement as fully and with the same effect as if the same had been set forth at length in the body of this agreement.

In consideration of the premises the party of the first part hereby agrees to pay to the party of the second part for said work, when completed in accordance with the said specifications, the sum of . . . . .

payments to be made as provided in said specifications upon presentation of the proper certificates of the engineer and supervisor and upon the terms set forth in the annexed specifications.

This contract to be binding upon THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF . . . . . their successors or assigns, and upon . . . . .

the party of the second part. . . . .

~~In Witness Whereof~~, The Director of THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF . . . . . by authority of a resolution of said Board, hath hereunto set his hand and affixed the corporate seal of the said Board and the said party of the second

# ELEVENTH ANNUAL REPORT.

part ha...hereunto set.....hand.. and seal.. the day and  
year first above written.

DIRECTOR OF THE BOARD OF CHOSEN FREE-  
HOLDERS OF THE COUNTY OF.....

Signed, sealed and delivered in the presence of

This contract approved this.....day of.....190

STATE COMMISSIONER OF PUBLIC ROADS.

KNOW ALL MEN BY THESE PRESENTS, That we.....  
and.....of the County of  
.....and State of New Jersey, are held and  
firmly bound unto THE BOARD OF CHOSEN FREEHOLDERS OF  
THE COUNTY OF.....in the sum of.....  
.....dollars, lawful money of the United States, to be paid to  
the said THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY  
OF.....their successors or assigns, to which  
payment well and truly to be made, we bind ourselves, our heirs, executors  
and administrators, jointly and severally, firmly by these presents.

Sealed with our seals and dated this.....day of

A. D. nineteen hundred and.....  
The Condition of this Obligation is Such, That if the above bounded .....  
shall well and truly perform his part of the contract hereto annexed, and all  
the covenants and conditions therein perform, then this obligation to be  
void, otherwise to remain in full force and virtue.

SIGNED, SEALED AND DELIVERED /  
IN THE PRESENCE OF }

This Bond approved this..... day of.....  
A. D. 190.....

DIRECTOR.

**We It Remembered,** On this..... day of.....  
..... in the year of our Lord one thousand  
nine hundred and..... before me, a Master in Chancery  
of the State of New Jersey, personally appeared.....  
..... and.....  
..... who acknowledged that they signed, sealed and  
delivered the foregoing bond as their voluntary act and deed for the uses  
and purposes therein expressed.

JUSTIFICATION OF SURETY.

STATE OF NEW JERSEY, }  
COUNTY OF..... } ss.

On this..... day of..... A. D. 190..  
before me, a Notary Public in and for the County and State aforesaid, per-  
sonally appeared.....  
who, being duly sworn, on his oath declares that he is a resident of the  
County of..... in the State of New Jersey; that  
he is a freeholder in said County, and that he owns real estate in said County,  
in his own right, to the amount of.....  
over and above all his indebtedness and after all his debts are paid, and over  
any contingent liability by reason of being bail, surety, endorser or guarantor.

Subscribed and sworn to before me, this..... day of.....  
..... A. D. 190..... I hereby certify that the contents of  
the above have been carefully made known to affiant before execution.

STATE OF NEW JERSEY, }  
COUNTY OF..... } ss.

On this..... day of..... A. D. 190..  
before me, a Notary Public in and for the County and State aforesaid, per-  
sonally appeared.....  
who, being duly sworn, on his oath declares that he is a resident of the  
County of..... in the State of New Jersey; that  
he is a freeholder in said County, and that he owns real estate in said County,  
in his own right, to the amount of.....  
over and above all his indebtedness and after all his debts are paid and over  
any contingent liability by reason of being bail, surety, endorser or guarantor

Subscribed and sworn to before me, this..... day of.....  
..... A. D. 190..... I hereby certify that the contents of  
the above have been carefully made known to affiant before execution.

**Standard State Aid Specifications for Gravel Roads as Amended  
by the State and County Road Engineers February  
1st, 1901, and Revised May 20th, 1903.**

..... COUNTY, NEW JERSEY.



BEGINNING .....

.....

.....

**SPECIFICATIONS.**

FOR A GRAVEL ROAD IN.....COUNTY, NEW  
JERSEY, KNOWN AS.....  
BEGINNING AT..... and  
EXTENDING TO.....  
A DISTANCE OF..... FEET, OR..... MILES  
..... FEET WIDE AND..... INCHES DEEP.

**WORK TO BE PERFORMED.**

1. The work to be performed will consist in furnishing \*all tools, machinery and labor necessary for the efficient and proper grading of roadway, side ditches and side banks; laying, spreading and rolling of road material, and leaving the roadway complete in every manner ready for immediate use.

**PLANS AND DRAWINGS.**

2. The plan, profile and cross-sections on file in the office of the State Commissioner of Public Roads and at the office of..... County Engineer.....New Jersey, show general location, profile, details and dimensions. The work will be constructed in all respects according to the above-mentioned plans, profile and cross-sections, which form part of these specifications.

3. Any variation of location, profile, size and dimensions from that shown on the plans, as may be required by the exigencies of construction, will, in all cases, be determined by the Engineer; but the contractor shall not, on any pretense, save that of the written order of the contracting parties, deviate from the intent of the plans or specifications.

4. On all drawings, figured dimensions are to govern in cases of discrepancy between scale and figures.

## GRADING.

5. Under this head will be included all excavations and embankments required for the formation of the highway; cutting all ditches or drains about or contiguous to the road; removing all fences, walls, buildings, trees, poles or other encumbrances; the excavation and embankment necessary for reconstructing cross or branch roads in cases where they are destroyed or interfered with in the formation of the roadway, and all other excavations and embankments connected with or incidental to the construction of the said road.

## EXCAVATION.

6. The roadway to the width of.....feet as shown on plan must be excavated or built to the same curvature as that of the surface of the road when finished; the grade, from center to sides, must be as shown on plans.

7. The earth taken away from any cut or ditch shall be deposited where the Engineer may direct, either within or without the lines of the road, but no earth shall be removed from the line of the road without the order of the Engineer.

## EMBANKMENT.

8. Material taken from the excavations, except when otherwise directed by the Engineer, shall be deposited in the embankments, either on the roadway or sidewalks.

9. When there is not sufficient material in the excavations of the road to form the embankments, the deficiency must be supplied by the contractor from without the road. The character of said material and place of excavation must be approved by the Engineer. Said material is to be paid for at the same price per cubic yard as specified in the contract for other excavation.

10. The embankments will be formed in layers of such depth, generally twelve (12) inches, and the material deposited and distributed in such manner as the Engineer may direct, the required allowance for settling being added.

## SLOPES.

11. Slopes in both embankment and excavation shall be one and one-half ( $1\frac{1}{2}$ ) horizontal to one (1) vertical, unless otherwise ordered by the Engineer.

## ROADWAY.

## SUB-FOUNDATIONS.

12. When the excavations and embankments have been brought to a proper depth below the intended surface of the roadway, the cross-section conforming in every respect to the cross-section of the road when finished, the same shall, if ordered by the Engineer, be rolled until approved by him.

If any depressions form under such rolling, owing to improper material or vegetable matter, the same shall be removed and good earth substituted and the whole re-rolled until thoroughly solid and to above-mentioned grade.

#### SHOULDERING.

13. A shoulder of firm earth or gravel is to be left or made on each side of the gravel bed, extending at the same grade and curvature of road to side ditches or gutters. This shoulder is to be rolled according to the directions of the Engineer.

#### UNDER-DRAINS.

14. Under-drains, if found necessary, shall be constructed by the contractor (at prices named in bids) of good.....inch tile, laid upon a board of not less than one (1) inch in thickness and six (6) inches in width, whenever and wherever the Engineer shall decide; top of tile or pipe must be at least.....inches deep, unless otherwise directed by the Engineer, the joints of the tile or pipe must be covered with salt hay or material equally as good, and trench filled with pervious earth.

15. When directed by the Engineer a stone drain may be used in place of the tile drains. A trench one foot in width and one foot six inches in depth shall be excavated below the sub-grade, said excavation to be filled with loose broken stone to a depth required by the Engineer.

#### MATERIAL.

16. The material to be used in surfacing the road is to be furnished by the.....without any cost to the.....

17. The Road Committee, in conjunction with the Engineer, subject to the approval of the Board of Chosen Freeholders, will pass upon and approve all gravel to be used in surfacing the road. The contractor is to dig, cart and place upon the road, in accordance with the specifications, the gravel selected and use no other. Should any objectionable material be used, he is to remove the same at his own expense.

18. The contractor must furnish to the Engineer samples of the kind of gravel to be used in the work before the opening of the bids.

19. The gravel is to be placed upon the road in such manner as shall be approved by the Engineer, and be thoroughly rolled and solidified until it is consolidated, firm and approved by the Engineer. The gravel shall be of such thickness that when it is thoroughly compacted and approved, it shall be.....inches deep in the center and slope at a regular grade to.....inches in depth at a distance of.....feet on each side of the center line.

20. Should any depressions appear these are to be carefully filled with gravel, so that the finished road will conform to the approved profile.

21. The contractor is to be paid by the cubic yard, as per depths above named, for the compacted gravel that he puts on the road, at the price named in the accepted bid, which shall include finishing the road and shaping the shoulders as above specified.

22. The contractor is to place sufficient gravel on the road to allow it to shrink thirty-three per cent. in rolling and settling.

### OVERHAULS.

(This only to apply when county furnishes the gravel.)

23. The contractor will not be required to cart any gravel a greater distance than one-half mile without extra pay for each extra half mile of carting or fraction thereof, at a price per compact cubic yard named in his accepted bid.

24. All gravel used for surfacing found within one-half mile of the place where it is to be used, whether on the line of the road or not, must be carted without extra pay.

### SIDEWALK.

25. The contractor will also be required, when the Engineer so directs, to grub and remove from a strip of land.....feet on outside of curb-lines all material objectionable to the Engineer, such as trees, stumps, roots and brush, and refill the holes with earth, thereby completing the opening of the entire road to a width of.....feet, which shall be.....feet on each side of the center line.

26. The grubbing and removing of such objectionable material that is ordered by the Engineer shall be styled as "grubbing" and paid for by the acre at price named in accepted bid.

### STRIPPING GRAVEL BEDS.

(This only to apply when county furnishes gravel.)

27. Some of the gravel beds are covered with objectionable surface material which must first be removed by the contractor and deposited within one-half mile, where the Engineer so directs, which shall be paid for by the county at a price per cubic yard named in accepted bid for removing or stripping such objectionable material from top surface of gravel bed. No allowance will be made for removing stumps, trees, brush or roots from gravel pit.

### OPEN DITCHES.

28. The contractor is to grade the shoulders and open all necessary side ditches (as per stakes furnished by the Engineer) so that there will be no water allowed to stand by the side of the road or upon it, for which no extra payment will be allowed.

## EXTRA DEEP.

29. Should the Road Committee so order, the contractor is to build in all respects, as already specified, the gravel bed to a greater depth or thickness than that already named. The contractor is to do the same at a price named per square yard for each extra inch in depth.

## NO EXTRA PRICE.

30. No allowance in measure of depth of pavement will be made on account of any material which may be driven into the road-bed by rolling. The pavement when completed must conform to the grade and cross-section, and be satisfactory to the Engineer, whose decision shall be final.

31. No extra work will be paid for unless the price has been agreed upon between the contracting parties, including the State Commissioner of Public Roads, and endorsed upon the agreement, witnessed by the Engineer.

## BROAD TIRE WAGONS.

32. All wagons and carts used during the construction for hauling stone, earth or any other material must have tires not less than three and one-half ( $3\frac{1}{2}$ ) inches in width.

## BIDS.

33. Bids will be received under these specifications for the road complete as follows:

(1) Price per cubic yard for earth excavation, without classification, as per plans and cross-sections throughout the length and width of the road.

(2) Price per acre for grubbing and removing objectionable material from sidewalks.

(3) Price per lineal foot for completed tile drain.

(4) Price per cubic yard for compacted gravel as specified.

(5) Price per cubic yard for carting gravel more than one-half mile and each additional half mile or fraction thereof.

(6) Price per cubic yard for stripping or removing earth from top of gravel bed.

(7) Price per square yard for each ordered inch in depth in excess of thickness named.

(8) Price (lump) for the whole road complete, according to the specifications and plans prepared by the Engineer.

No bid will be received in which all the above items are not filled out.

Items Nos. 5 and 6 only to apply when county furnishes gravel.

The person bidding the lowest on the aggregate of above propositions will be considered the successful bidder (all other things being equal.)



## ESTIMATES OF QUANTITIES.

34. (1) Earth excavation .....cubic yards.  
 (2) Grubbing .....acres.  
 (3) Tile drain .....lineal feet.  
 (4) Compacted gravel .....cubic yards.  
 (5) Overhauls .....cubic yards.  
 (6) Stripping .....cubic yard  
 Total estimated cost of the road, \$. .....

35. These quantities are the result of calculation, but are to be considered as approximate. The County will not be responsible for any excess in above quantities, should any occur. The contractor is expected to satisfy himself, by a personal examination of the work contemplated, about the nature, character and quantity of the labor and material required.

## CHECK ACCOMPANYING BIDS.

36. Bids shall be accompanied with a certified check, payable to the Director of the Board of Chosen Freeholders, for the sum of One Thousand (\$1,000.00) Dollars, as a guarantee that if the contract shall be awarded to him he will, when required by said Board, execute an agreement in writing to perform the work according to the specifications, and upon failure by the contractor to enter into said agreement with the said Board of Chosen Freeholders, said certified check shall be forfeited and considered as liquidated damages.

## LIABILITIES OF CONTRACTOR.

37. He shall keep up sufficient guards by day and night to prevent accidents, from travel, and will be liable for any damage which may arise from his neglect to do so, or from any omission on his part.

38. He is to commence and prosecute the work upon the road at such points as may be directed by the Engineer within .....days from and after the signing of the contract, and shall continue work thereon until completion, except as herein provided.

39. He further agrees to complete the same on or before the ..... day of ..... A. D. ....

40. Twenty dollars for each day that the work shall remain uncompleted, after the time allowed by contract, may be deducted, as liquidated damages, from any moneys due contractor, unless otherwise agreed upon by the Board of Chosen Freeholders, after presentation of certificate of the Engineer recommending the extension of the time limit of completion. A bonus or premium of one dollar per week will be paid the contractor for each week the road is completed before the time specified in the contract.

41. The contractor shall keep the finished roadway and earthwork in repair for the period of one year from the date of its completion and acceptance,

during which time he shall be liable for wear and tear caused by ordinary travel, and in addition thereto, for as much longer as for any period or periods during said year it shall be out of proper condition. If, during that time, the roadway or any part of the work shall, in the judgment of the Engineer and the Board of Chosen Freeholders, require repairing, and they shall duly notify the contractor to make such repairs as required, and the contractor should refuse or neglect to do so to the satisfaction of the said Engineer and Board of Chosen Freeholders, within five days from the date of service of notice, then the said Engineer and Board of Chosen Freeholders shall have the right to have the work done properly by other parties and pay the expense for the same out of the five per cent. retained.

42. The contractor will be required to preserve all stakes and bench-marks made and established on the line of work until duly authorized by the Engineer to remove the same.

43. The contractor shall not disturb the position of title stones (the corners of properties adjacent to the road), but where they appear he will either lift or lower them, under the personal supervision of the Engineer.

44. The contractor must also preserve the roadway on which he is working from needless obstruction, and where necessary, construct safe and commodious crossings, to be maintained in good order. He shall afford all proper and reasonable means for the accommodation of the public, and leave the roadway complete in every manner ready for immediate use.

#### PROVISION FOR DRAINAGE.

45. If it is necessary in the prosecution of the work to interrupt or obstruct the natural drainage of the surface, or the flow of artificial drains, the contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interests. He shall be held liable for all damages which may result from any neglect to provide for either natural or artificial drainage, which he may have interrupted.

#### RIGHT TO BUILD BRIDGES, CULVERTS, ETC., AND SUSPENSION OF WORK.

46. The right of the county to build bridges, culverts, lay pipes or other appurtenances in said road during the progress of the work, as well as suspending the work or any part thereof during the construction of the same, for the purposes above stated, is expressly reserved, without further compensation to the contractor for such suspension than an extension of time for completing the work as much as it may have been delayed by such suspension.

#### STOPPING WORK ON ACCOUNT OF WEATHER.

47. The Engineer or Supervisor may stop any portion of the work if, in their judgment, the weather is such as to prevent the same being done properly. No allowance of any kind will be made for such stoppage, except an extension of the time for the completion of the work as herein provided.

## ABANDONMENT OF CONTRACT.

48. If at any time the work under contract should be abandoned, or if at any time the Engineer should judge and so certify in writing that said work, or any part thereof, is unnecessarily delayed, or that the contractor is wilfully violating any of the conditions or covenants of this contract, or is executing the same in bad faith, then, and in that case, the Board of Chosen Freeholders shall notify the said contractor to discontinue all work under this contract. They may employ other parties to complete the work in such manner as they may decide, and use such material as may be procured upon the line of aforesaid work, and, if necessary, to procure other material for its completion, and charge the expense of the said labor and material to the contractor, which expense shall be deducted from any moneys due him under contract. In case these expenses shall exceed the sum which would have been payable under contract, if the same had been completed by said contractor, he or his bondsmen shall pay the amount of the excess to the Board of Chosen Freeholders, on notice from the Engineer.

## ENGINEER.

49. The Engineer is to be selected or appointed by the Board of Chosen Freeholders and paid by them. He is to furnish all surveys, profiles, plans specifications and estimates of quantities of all kinds before specifications are signed, and in such a clear manner that lump bids can be made upon the work. He shall furnish all lines and grades required for the completion of the work. He is also to furnish estimates for quantities of work done before partial payments can be made, the quantity of road laid being determined by surface measurements. Should any difference arise between the contracting parties as to their meanings, his decisions on these matters are to be final and conclusive. The work is to be done according to his directions, and if any material of which he does not approve is brought upon the road, it is to be removed at the expense of the contractor. If the contractor fails or neglects to do any part of the work as specified or as directed by the Engineer, then in that case all other work shall be discontinued on notice from the Engineer to the contractor, or to the superintendent or foreman in charge of the work for the contractor, until such time as the work complained of has been done to the satisfaction of the Engineer; and the contractor will not be entitled to or allowed any compensation or extension of time for such discontinuation or suspension of the work.

## SUPERVISOR.

50. Nothing in these specifications relating to the duties of the Engineer shall be taken or construed in any manner to conflict with the duties of the Supervisor, as specifically set forth in the act entitled "An act to provide for the permanent improvement of public roads of this state," approved April 1st, 1903, and the acts supplementary thereto, but they shall co-operate as far as practicable.

## INCOMPETENT WORKMEN.

51. The contractor shall employ competent men to do the work, and whenever the Supervisor shall inform him, or his representative in charge, in writing, that any man on the work is unfitted for the place, or is working contrary to the provisions of the specifications or the instructions of the Engineer and Supervisor, he shall thereupon be discharged.

## INSPECTION.

52. All directions and determinations necessary to give due and full effect to any of the provisions of these specifications shall be given by the Engineer and Supervisor.

53. All material and workmanship of any kind shall be subject at all times to the inspection of the Engineer and Supervisor. Whenever unfaithful and imperfect work is discovered, it shall be immediately repaired or replaced by the contractor, after due notification from the Engineer and Supervisor.

## SUB-LETTING OF CONTRACT.

54. The contractor shall not assign or sub-let any portion of this contract without the consent of the Board of Chosen Freeholders and the State Commissioner of Public Roads.

## PAYMENTS.

55. ....monthly payments will be made by the Board of Chosen Freeholders to the contractor for work performed, upon presentation by him of the proper certificates of the Engineer and Supervisor in a sum not to exceed eighty per cent. of the amount then due, together with releases from all liens, if required. Fifteen per cent. will be paid at the completion of the work. The remainder or five per cent. will be retained by the Board of Chosen Freeholders for a period of one year, or until the road is finally approved as hereinbefore set forth.

## BOND OF CONTRACTOR.

56. The contractor will be required to execute, within thirty days of giving of contract, a bond in such sum and with such securities as shall be approved by the Board of Chosen Freeholders, conditioned for the faithful performance of the contract, to indemnify and save harmless the said Board of Chosen Freeholders from all suits or actions of any name or description brought against them on account of any act or omission of the contractor or his agents,

and for the faithful performance of the contract by the contractor. Said bond shall be in a sum of not less than the estimated cost of the road when completed. Any change made in said plans, specifications, agreements or quantities without the consent of the bondsmen shall in no way vitiate said bond. The said contractor hereby further agrees that so much of the money due him, under and by virtue of this agreement, as shall be considered necessary by the Board of Chosen Freeholders, may be retained by them until all such suits or claims for damages aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the said Board of Chosen Freeholders.

CONTRACTOR TO INSURE PAYMENT FOR LABOR, MATERIAL,  
ETC., ON FINAL ESTIMATE.

57. The contractor must also furnish said Engineer and Supervisor with satisfactory evidence that all persons who did work, or furnished material for this contract, or who have sustained damage or injury by reason of any act, omission or carelessness on his part or his agents in the prosecution of the work have been duly paid or secured; he shall also give notice to said Engineer and Supervisor within ten days after the completion of the work, and before final estimate is made, that any balance for such work or materials, or compensation for such damages due, has been fully paid or released.

The right to increase or decrease the quantity of work and to reject any or all bids is reserved.

.....  
COUNTY ENGINEER.

.....  
ROAD COMMITTEE.

Approved this ..... day of ..... A. D. 190....  
by resolution of the Board of Chosen Freeholders,

.....  
DIRECTOR.

Attest:

.....  
CLERK.

## ELEVENTH ANNUAL REPORT.

OFFICE OF STATE COMMISSIONER OF PUBLIC ROADS,  
TRENTON, N. J.

I have this day carefully read and examined the foregoing specifications, and the same are hereby approved. ~~W. J. H. H.~~

Any departure from these specifications which increases the cost of the road must have the written consent of the State Commissioner of Public Roads.

Given under my hand, this ..... day of ..... A. D. 190

.....  
STATE COMMISSIONER OF PUBLIC ROADS.

PROPOSAL.

TO THE BOARD OF CHOSEN FREEHOLDERS, COUNTY OF.....  
AND STATE OF NEW JERSEY:

GENTLEMEN—The undersigned hereby declare... that...he...ha...  
carefully examined the annexed specifications and the drawings therein  
referred to, and will provide all necessary machinery, tools, apparatus.  
and other means of construction, and do all the work and furnish all the  
material called for by said specifications in the manner prescribed by the  
specifications and the requirements of the Engineer and Supervisor under  
them, for the following prices:

- (1) Price per cubic yard for earth excavation, without classification, as  
per plans and cross-sections, throughout the length and width of  
the road.....per cubic yard.
- (2) Price per acre for grubbing and removing objectionable material from  
sidewalks.....per acre.
- (3) Price per lineal foot for completed tile drain.....per lineal foot.
- (4) Price per cubic yard for compacted gravel as specified.....  
.....per cubic yard.
- (5) Price per cubic yard for carting gravel more than one half mile and  
each additional half mile or fraction thereof.....  
.....per cubic yard.
- (6) Price per cubic yard for stripping or removing earth from top of gravel  
bed.....per cubic yard.
- (7) Price per square yard for each ordered inch in depth in excess of thick-  
ness named.....per square yard.
- (8) Price (lump) for the whole road complete, according to the specifica-  
tions and plans prepared by the Engineer.....

Accompanying this proposal is a certified check for the sum of one thous-  
and (\$1,000) dollars, payable to the order of the Director of the Board of  
Chosen Freeholders of.....County; which  
check is to be forfeited as liquidated damages if, in case this proposal is  
accepted, the undersigned shall fail to execute a contract with said Board  
of Chosen Freeholders, under the conditions of this proposal, within the  
time provided for by the foregoing advertisement for proposals; otherwise  
said check is to be returned to the undersigned.

Signed .....

Address .....

.....N. J.,.....

## CONTRACT.

This agreement, made the . . . . . day of . . . . . in the year of our Lord one thousand nine hundred . . . . . between THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF . . . . . party of the first part, and . . . . .

party of the second part,

**Witnesseth**, That the said party of the second part, for and in consideration of the payments hereinafter specified and agreed to be made by the party of the first part, hereby covenant and agree to furnish and deliver all the materials and to do and perform all the work and labor required to be furnished and delivered, done and performed in and about the macadamizing of . . . . . beginning at . . . . .

and extending to . . . . .

in the township of . . . . . a distance of . . . . .

in strict and entire conformity with the plans on file in the engineer's office and with the specifications hereto annexed and duly approved by resolution of THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF . . . . . adopted the . . . . . day of . . . . . in the year of our Lord one thousand nine hundred . . . . . and approved by the State Commissioner of Public Roads on the . . . . . day of . . . . .

in the year of our Lord one thousand nine hundred . . . . . which said plans and specifications are hereby made part of this agreement as fully and with the same effect as if the same had been set forth at length in the body of this agreement.

In consideration of the premises the party of the first part hereby agrees to pay to the party of the second part for said work, when completed in accordance with the said specifications, the sum of . . . . .

payments to be made as provided in said specifications upon presentation of the proper certificates of the engineer and supervisor and upon the terms set forth in the annexed specifications.

This contract to be binding upon THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF . . . . . their successors or assigns, and upon . . . . .

the party of the second part . . . . .

**In Witness Whereof**, The Director of THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF . . . . . by authority of a resolution of said Board, hath hereunto set his hand and affixed the corporate seal of the said Board and the said party of the second



part ha....hereunto set.....hand and seal.. the day and  
year first above written.

.....  
DIRECTOR OF THE BOARD OF CHOSEN FREE-  
HOLDERS OF THE COUNTY OF.....  
.....  
.....  
.....

Signed, sealed and delivered in the presence of  
.....

This contract approved this.....day of.....190  
.....

STATE COMMISSIONER OF PUBLIC ROADS.

KNOW ALL MĒN BY THESE PRESENTS, That we.....

and.....of the County of  
.....and State of New Jersey, are held and  
firmly bound unto THE BOARD OF CHOSEN FREEHOLDERS OF  
THE COUNTY OF.....in the sum of.....  
.....dollars, lawful money of the United States, to be paid to  
the said THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY  
OF.....their successors or assigns, to which  
payment well and truly to be made, we bind ourselves, our heirs, executors  
and administrators, jointly and severally, firmly by these presents.

Sealed with our seals and dated this.....day of

.....A. D. nineteen hundred and.....  
The Condition of this Obligation is Such, That if the above bounden.....

shall well and truly perform his part of the contract hereto annexed, and all  
the covenants and conditions therein perform, then this obligation to be  
void, otherwise to remain in full force and virtue.

SIGNED, SEALED AND DELIVERED }  
IN THE PRESENCE OF }

.....

This Bond approved this.....day of.....  
 A. D. 190

.....  
 .....  
 .....  
 .....

.....  
 DIRECTOR.

**Be It Remembered,** On this .....day of  
 .....in the year of our Lord one thousand  
 nine hundred and.....before me, a Master in Chancery  
 of the State of New Jersey, personally appeared.....  
 .....and.....  
 .....who acknowledged that they signed, sealed and  
 delivered the foregoing bond as their voluntary act and deed for the uses  
 and purposes therein expressed.

.....

JUSTIFICATION OF SURETY.

STATE OF NEW JERSEY, }  
COUNTY OF..... } ss.

On this.....day of.....A. D. 190..  
before me, a Notary Public in and for the County and State aforesaid, personally appeared.....  
who, being duly sworn, on his oath declares that he is a resident of the County of.....in the State of New Jersey; that he is a freeholder in said County, and that he owns real estate in said County, in his own right, to the amount of.....  
over and above all his indebtedness and after all his debts are paid, and over any contingent liability by reason of being bail, surety, endorser or guarantor.

Subscribed and sworn to before me, this.....day of.....A. D. 190..... I hereby certify that the contents of the above have been carefully made known to affiant before execution.

STATE OF NEW JERSEY, }  
COUNTY OF..... } ss.

On this.....day of.....A. D. 190..  
before me, a Notary Public in and for the County and State aforesaid, personally appeared.....  
who, being duly sworn, on his oath declares that he is a resident of the County of.....in the State of New Jersey; that he is a freeholder in said County, and that he owns real estate in said County, in his own right, to the amount of.....  
over and above all his indebtedness and after all his debts are paid, and over any contingent liability by reason of being bail, surety, endorser or guarantor.

Subscribed and sworn to before me, this.....day of.....A. D. 190..... I hereby certify that the contents of the above have been carefully made known to affiant before execution.



## APPENDIX B.

---

An Act to provide for the permanent improvement of public roads in this State, approved April 1, 1903.

### CHAPTER 97.

An Act to provide for the permanent improvement of public roads in this State.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. The board of chosen freeholders of any county in this State may, at any time, by resolution, direct that any public road or section of road, located within said county, being at least one mile in length, or, being less than one mile in length, is an extension of or connection with some permanently improved or paved road or street, be improved by the construction of a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good materials, in such manner that the same, of whatever materials constructed, shall, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel; or whenever a road is petitioned for by the owners of two-thirds of the lineal feet along said road praying the board to cause such road to be improved under this act, it shall be the duty of the board to cause such improvement to be made in the same manner and under the same conditions as by resolution; when more roads are applied for than can be constructed in any one year, the boards of chosen freeholders and state commissioner of public roads shall have power and authority to select from the roads petitioned for the ones first to be constructed,

Permanent  
improve-  
ment of  
roads.

When peti-  
tioned.

Selection of  
roads.

**Township's  
share.**

having first regard to the most important roads and the distribution of the benefits of this act to all parts of their counties; the board of chosen freeholders may, before approval of any road, require as a condition of said approval that the township or townships or other municipality, through which said road runs shall pay ten per centum of the cost of said improvement, said payment to be applied to the improvement of roads constructed under this act.

**Surveys.**

2. The said board, after the passage of the resolution or acceptance of the petition as aforesaid, shall cause a survey of said road so to be improved to be made and plans and specifications of the work to be done on the same to be prepared; the survey shall indicate the width and length of said road and shall also show how much of said road may be improved by deviation from the then existing lines; when the said plans and specifications shall have been prepared, they shall be submitted to the board of freeholders for its approval or rejection; if such board shall approve the same they shall then be submitted to the state commissioner of public roads for his approval or rejection, whose duty it shall be, before approving of said plans and specifications, to ascertain by personal inspection or otherwise, the natural character of the soil upon which such road is proposed to be constructed, and any and all other facts that he may deem important, and if, after examination of the plans and specifications and an inspection of the road, as aforesaid, he shall be satisfied as to the advisability of the improvement of the road as contemplated, and that one-third of the cost of the construction of said road, together with one-third of the cost of the construction of all other roads or sections of roads in this state under plans and specifications previously approved by him, will not in any one year exceed the sum of four hundred thousand dollars, then he shall approve said plans and specifications, otherwise he shall reject the same.

**Approval of  
plans by  
freeholders.**

**By commis-  
sioner of  
roads.**

**Amount.**

**Advertise-  
ment for  
bids.**

3. After the approval of the plans and specifications by the commissioner of public roads, it shall be the duty of the board of chosen freeholders to advertise for bids for said work in two or more of the public papers printed in said county, and in at least one engineering

journal published in the city of New York, for three weeks successively, at least once in each week, which said advertisement shall state the place where bidders may examine said plans and specifications and the time and place where bids for said work will be received by the board of chosen freeholders, or committee of said board; each bidder must accompany his bid with a certified check, payable to the director of the board of chosen freeholders, for one thousand dollars, as a guarantee that if said work is awarded to him he will enter into a contract with said board for the same, which contract must be executed, together with a bond of the successful bidder, in the penal sum of at least the estimated cost of said work, with two or more sureties, freeholders of the county, or a surety or trust company created by this State, or a surety or trust company of another State authorized to transact business within this State, to be approved by the director of the board of chosen freeholders, conditioned for the faithful performance of said work in strict conformity with the plans and specifications for the same, within thirty days from the awarding of the contract, or such further time as said board shall grant, which contract, before any work is done thereunder, must be exhibited to the state commissioner of public roads for his approval, in writing, thereon, and said commissioner is hereby authorized, whenever in his judgment the best interests of the county require him so to do, to reject the same, in which case he shall write upon said contract the word "rejected" and append thereto his signature and official title of office, and said contract and the bond required to accompany the same shall, from the time of such rejection, be absolutely null and void, but such rejection shall in nowise operate to prevent said board from re-advertising for bids and proceeding thenceforth under the provisions of this act; the time and manner of payment for work done under any contract awarded under this act shall be set forth in said contract, and at least five per centum of the contract price shall not be paid to the contractor until after the expiration of one year from the completion of the work.

Check accompanying bid.

Sureties.

Contract; may be rejected.

Freeholders may re-advertise.

4. The estimated amount of all contracts for road

Limit to  
amount of  
contracts.

improvements awarded in any one year by the board of chosen freeholders, together with the estimated cost of repairs of roads-already constructed, shall not exceed one-half of one per centum of the ratables of the county, as reported to the state comptroller for the preceding year, exclusive of the state appropriation for road purposes apportioned to any county.

Anticipa-  
tion of ap-  
propriation.

5. The board of chosen freeholders may, in order that contracts for road improvements may be entered into and the work completed in time to receive the State's annual appropriation for road purposes, anticipate the appropriation to be made from the annual tax levy and award contracts for road improvements.

Papers filed  
with com-  
missioner  
of roads.

6. A true copy of the survey, contract, plans and specifications for road improvements, certified to be such by the director of the board of chosen freeholders, shall, immediately after the awarding of any contract, be furnished by the board of freeholders to the state commissioner of public roads, to be filed and remain of record in the office of such commissioner.

Supervisor.

7. Immediately after the awarding of any contract under the provisions of this act the state commissioner of public roads shall appoint a competent supervisor to take charge of the work required to be performed under said contract, who shall receive for his services the sum of three dollars per day; such supervisor, before assuming the duties of his office, shall make and subscribe an oath or affirmation, before any officer authorized to administer the same, that he will faithfully and to the best of his ability and understanding perform all the duties of his office; the state commissioner of public roads may summarily discharge any supervisor who, in his judgment, is incompetent or negligent in the performance of his duties, and may appoint a new supervisor in the place of the one so discharged; where any contract provides for partial payments based upon the amount of work done it shall be the duty of such supervisor, as each payment becomes due, to present to the board of freeholders his certificate, and also the certificate of the engineer, in which certificate shall be stated, as near as can be, the amount of work done for which payment is to be made, and that the same has been done, in all respects, in strict conformity

Pay; oath;  
removal.

Partial pay-  
ments to  
contractor.



with the contract and plans and specifications; when the work done under any contract shall have been fully completed, the supervisor and engineer shall prepare a detailed and itemized statement, in quadruplicate, of the cost of the improvement, one copy whereof shall be filed with the board of freeholders, one with the clerk of the county and two with the state commissioner of public roads.

Reports  
filed upon  
completion  
of work.

8. One-third\* of the cost of all roads constructed under this act, not exceeding in any one year the sum of four hundred thousand dollars, shall be paid out of the state treasury, out of any moneys not otherwise appropriated, if the same be first appropriated in the annual appropriation act; the governor and state commissioner of public roads shall, between December fifteenth and thirty-first of each year, certify to the state comptroller the amount to be paid to any county for such year, and the state comptroller shall draw his warrant on the state treasurer in favor of the county collector of such county for the amount so certified, and the state treasurer shall thereupon pay the same.

State's pro-  
portion,  
one-third.

9. On or before the day fixed by law for the meeting of the county board of assessors in any county in each year the board of chosen freeholders of such county shall certify to the said county board of assessors, either in the annual tax budget or separately, two-thirds of the estimated cost of all work contracted for under the provisions of this act since the day fixed by law for the meeting of the board of assessors in the year next preceding; and the county board of assessors shall include in their assessment of county taxes the sum so certified, and the same shall be collected and paid over to the county in the same manner and at the same time that other county taxes are collected and paid over; if a deficiency shall exist in consequence of the cost exceeding the estimate, or in consequence of the receipt of less than one-third of the cost from the state, the board of chosen freeholders shall have authority to borrow, on temporary loans, such deficiency until the next annual taxes shall be collected and paid over to the county and until the full amount due said county from the state shall have been paid; if

Two-thirds  
to be  
raised by  
county;  
notice to  
assessors.

If de-  
ficiency.

Temporary  
loans.

If surplus. there be a surplus, by reason of the estimate exceeding the cost, the same shall be retained and used in the construction of other roads under this act, or in repairs to roads constructed under this act.

May issue  
bonds in-  
stead of  
taxation.

Designation,  
time, rate.

Principal  
and in-  
terest.

County  
roads, their  
care, &c.

10. The board of chosen freeholders may, instead of certifying to the county board of assessors the two-thirds cost of any work done under this act, as required by the ninth section of this act, by resolution, adopted by a vote of at least two-thirds of all its members, issue bonds of the county for two-thirds of the estimated cost of said work, which bonds shall be designated as "road improvement bonds," and shall be for such sums and in such amounts, payable in not less than six nor more than thirty years from date thereof, with interest at a rate not exceeding five per centum per annum, payable annually, as said board of freeholders, by said resolution, may determine; said bonds shall be signed by the director of the board of chosen freeholders and by the county collector, sealed with the seal of the board, properly numbered, and a registry thereof kept by the board, and may be either coupon or registered bonds, and, if coupon bonds, the coupons shall be signed by the director of the board, and shall be numbered to correspond to the several bonds to which they shall be severally attached; the board of freeholders shall, when bonds are issued under the provisions of this section, certify to the county board of assessors, in each and every year so long as any of said bonds remain outstanding, a sum sufficient to pay the interest accruing on said bonds for said year and the principal of any bond or bonds that shall mature in said year, and the said county board of assessors shall include the said sum in the annual tax levy or assessment for said year, and the same shall be collected and paid over in the same manner and at the same time as other county taxes.

11. Any road constructed under the provisions of this act, except within the limits of any city, shall forever thereafter be a county road, and the duty of keeping the same in repair, except within the limits of any city, shall devolve exclusively upon the board of chosen freeholders; if any such road shall become out of repair, except such portions thereof as may lie

within the limits of any city, and shall not be repaired within sixty days after notice so to do, given by the state commissioner of public roads to the board of chosen freeholders, or to its director, the said commissioner of public roads shall certify such neglect or refusal to the state comptroller, who shall withhold payment to such county of any moneys already appropriated, or that may thereafter be appropriated, to such county by the state, and no payment shall be made to said county until the state commissioner of public roads shall certify to the state comptroller that said road has been placed in a good state of repair.

Moneys withheld for neglect. -

12. After the first road shall have been constructed under this act in any county, it shall be the duty of the board of chosen freeholders to appoint some suitable person as county supervisor of roads, who, before assuming the duties of his office, shall make and subscribe an oath or affirmation that he will faithfully perform all the duties of his office to the best of his ability and understanding; such supervisor shall hold his office for three years and until his successor is appointed and qualified; shall give bond to the board of chosen freeholders in the penal sum of one thousand dollars, conditioned for the faithful performance of the duties of his office, with such surety or sureties as the board shall approve, and shall receive such compensation for his services as the said board shall determine; the board of chosen freeholders shall appropriate all moneys necessary to keep any and all roads constructed under this act, except within the limits of any city, in good repair, and if the board shall have no money which may be lawfully used for repairs, it shall have the power to borrow the same, on the credit of the county, until the next annual taxes shall have been levied and collected; the cost of all repairs shall be paid by the county collector upon the order of the board of chosen freeholders, and all bills for repairs shall be verified by affidavit and shall be certified to be correct by the county supervisor of roads; any portion of any public road improved under the provisions of this act which may lie within the limits of any city shall forever after such improvement be kept in repair by such city, and such city shall have the same power, authority and jurisdiction

County supervisor of roads.

Bond, surety, compensation.

Maintenance of roads.

When road in city.

This Bond approved this.....day of.....  
 A. D. 190

.....  
 .....  
 .....  
 .....

.....  
 DIRECTOR.

**We It Remembered,** On this .....day of  
 .....in the year of our Lord one thousand  
 nine hundred and.....before me, a Master in Chancery  
 of the State of New Jersey, personally appeared.....  
 .....and.....  
 .....who acknowledged that they signed, sealed and  
 delivered the foregoing bond as their voluntary act and deed for the uses  
 and purposes therein expressed.

.....

said contract to be first submitted to the board of chosen freeholders for its approval; upon the completion of the work to the satisfaction of said supervisor and the board of freeholders, and upon the submission to said board of proper receipts showing full payment for all work done, the said board of freeholders may, by resolution, declare that said road, or any portion thereof, except within the limits of any city, be thereafter a county road; the location of any portion of said road may be changed, if deemed desirable, upon acquiring the consent, in writing, of the owner or owners of land abutting on such portion of road so to be changed and upon acquiring by gift the land necessary for such change; the said supervisor shall be paid the sum of twenty-five dollars for making the plans and specifications and supervising said work, to be paid by said owners.

15. Whenever any public road is sought to be improved under the provisions of the fourteenth section of this act, upon which road any lands or real estate owned by the State of New Jersey may front or border, the board of managers or other body having the control and management of said lands and real estate are hereby authorized to consent to the improvement of said road and to enter into contract for the same, in the manner directed by said section, and to pay for said improvement out of any moneys appropriated to said board of managers or other governing body.

When road borders on state property.

16. The provisions of this act shall extend to the improvement of any road, or section of road, constituting the boundary line between two counties, whenever said improvement shall be agreed to by the board of chosen freeholders of both counties.

Boundary roads.

17. The provisions of this act shall extend to townships, towns, boroughs, villages or any municipality or municipalities, all proceedings conforming, as near as possible, to the provisions of this act, and the governing bodies of any township, town, borough, village or municipality shall have the same power and perform the same duties as are conferred and devolve upon the board of chosen freeholders under the provisions of this act.

Extension of this act.

**Repealer.**

**Proviso.**

18. All acts and parts of acts inconsistent with the provisions of this act be and the same are hereby repealed; *provided*, that this repealer shall not revive any act heretofore repealed, nor shall any proceeding for the improvement of any public road, entered into before the passage of this act, abate, but such proceeding shall continue, as near as may be, as if the same had been commenced hereunder.

19. This act shall take effect immediately.

Approved April 1, 1903.

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## CHAPTER 239.

A Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this State," approved April first, one thousand nine hundred and three.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

**Joint improvement of roads.**

**Specifications and proposals.**

1. Wherever any road in this state runs in or through two or more counties, and said counties engage in the maintenance and operation thereof in its entirety, at joint expense, it shall and may be lawful for the boards of chosen freeholders of such counties, by resolution to be passed separately by each board, to declare their intention to cause such road, in its entirety, or any portion thereof, to be improved under the provisions of the above entitled act and the supplements thereto and amendments thereof as well as this supplement; and to cause all necessary surveys to be made and specifications to be prepared; and after said specifications shall be approved by such boards of freeholders, by resolutions passed separately by each board, the said specifications shall be certified to the state commissioner of public roads, for his approval or rejection, and if approved by him, such boards are authorized to appoint members from the board, to comprise a joint committee, to advertise for bids for said

improvement; which bids shall be furnished in sealed envelopes and presented to the committee in open meeting, at the time called for in the advertisement, and the amount of each of said bills shall, in open meeting, be publicly announced, and thereafter the members of the committee from each county shall report the amount of the bids to their respective boards, with their recommendations, and the contract shall be awarded, on resolution of each board voting separately, to the lowest responsible bidder, who shall furnish satisfactory security, to be approved of by said boards; that the contract for such improvement shall specify the proportion of the cost that each county will bear of said improvement, as between themselves, and neither county shall be liable for a greater amount than the proportion so specified; and the joint committee shall advertise for bids in at least two daily newspapers, printed and circulating in each county, for the period of two weeks, or in at least two weekly newspapers, printed and circulating in each of said counties, for at least four weeks; and all proceedings touching and concerning the improvement of such road shall conform as nearly as possible to the proceedings mentioned in the act to which this is a supplement, or any supplement thereto, or amendment thereof, except as modified by this act; and such counties taken together shall be entitled to receive one-third of the cost of the improvement set out in the specifications presented to the State road commissioner, as aforesaid, or as modified with his consent, in the manner specified in said act for the payment to any county for improving a road wholly within its limits; *provided, however*, that of said one-third so paid by the state each county shall receive the same proportion as it bears or is charged with on account of the cost of said improvement.

Awarding  
contract.Apportion  
cost.Advertis-  
ing.Proceed-  
ings.

State aid.

Proviso.

2. If in the opinion of either of such boards, to place in the tax levy for any one fiscal year the moneys necessary to pay for the work aforesaid, would be too burdensome on the taxpayers of such county, then, in order that each county may raise the funds wherewith to pay its share of the cost of such improvement, either board being of the opinion aforesaid may, by a resolution adopted by a vote of at least two-thirds of all its

Meeting  
cost.

<b>May issue bonds.</b>	<p>members, borrow such sum or sums of money as may be necessary for the payment of its share or proportion of such cost, by the sale of the bonds of such county, issued in the name of the board of chosen freeholders thereof, and in such sum as the board may deem proper, said bonds to bear interest at a rate not exceeding five per cent. per annum, and to be sold for not less than par, and said bonds shall not exceed in the aggregate the cost of the improvement to said board, and shall be so divided that one-tenth of the account of the bonds issued shall fall due in one year from their date and one-tenth each succeeding year thereafter, for the period of ten years from their date, and shall be either coupon or registered bonds, as the board of freeholders may determine; the principal and interest thereof shall be made payable at the office of the county collector of such county; said bonds shall be signed by the director of such board and the county collector, and shall be sealed with the seal of the county, and the county collector shall keep a record thereof; it shall be the duty of the board of chosen freeholders each year to place in the tax levy for such county, in each year, so long as said bonds shall run, a sufficient sum to pay the interest accruing thereon for said year and the principal of the bonds that shall mature in said year.</p>
<b>When payable.</b>	<p>3. Whenever the character of the soil or foundation of any road, or any part thereof, sought to be improved, and the traffic over the same, are such that in the opinion of any board seeking the same; if the road lies wholly within one county, or in the opinion of the boards jointly engaged in the maintenance and operation of a road in its entirety, running through two or more counties, ascertained by resolution passed by such boards separately, for such purpose, it is necessary to build a foundation for such road and pave the same with a block or other substantial pavement other than that specifically mentioned in the first section of the act to which this is a supplement, it shall be lawful for such boards to include such work in the specifications for said work to be presented to the state commissioner of public roads as aforesaid.</p>
<b>Interest and principal.</b>	<p>4. This act shall take effect immediately.</p>
<b>Paving public roads.</b>	<p>Approved April 8, 1903.</p>



## CHAPTER 231.

Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this State," approved April first, one thousand nine hundred and three.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. Whenever any public road has been or shall hereafter be improved under the provisions of the act to which this is a supplement, and in the course of improving such road the grade of the roadbed shall have been or shall be changed so that it shall not conform to the grade of the remaining portion of the road, including the sidewalks, it shall be lawful for the municipal authorities of each municipality through which such road passes to cause the remaining portion of such road within the limits of their several municipalities to be graded and formed so as to conform in grade to that established for the roadway constructed under the provisions of the act to which this is a supplement, and to cause such work to be done under the same proceedings and in the same manner as may be provided by law in their several municipalities for the grading of the streets of such municipalities.

Cause portions of road to conform to altered grade.

Proceedings.

2. The proper municipal authorities of any municipality through which any such road may run shall have full power and authority to make any municipal improvement upon or within any such road within the limits of their several municipalities which may be authorized by law to be made in any of the other public streets or roads of such municipalities; *provided, however*, no such improvement shall be made by such municipal authorities which may in any way interfere with or impair the roadway improved under the provisions of the act to which this is a supplement, without the approval and consent of the board of chosen freeholders of the county within which such road may be located.

Municipalities may improve road.

Proviso. 1

Assessment  
for  
benefits.

3. The cost and expense of any of the public improvements authorized by this act shall, so far as the same can be, be assessed upon the lands and real estate specially benefited by the improvement in proportion to the benefit received; and no lot or parcel of land shall be assessed more than it is so specially benefited, and such assessment shall be made in the same manner and under the same procedure as is directed by law for the making of other assessments for street improvements within every such municipality.

Maintenance  
of road.

4. Nothing in this act contained shall be construed to in any way impose upon any such municipality therein referred to any part of the cost of the maintenance and repair of the roadway of any road improved under the provisions of the act to which this is a supplement.

5. This act shall take effect immediately.

Approved April 8, 1903.

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## CHAPTER 61.

An Act to authorize the board of chosen freeholders of any of the several counties of this state to straighten, change the location of and vacate any portion of any public road or highway heretofore or hereafter acquired, constructed and improved in any such county by the board of chosen freeholders thereof, and to improve the portion included in such changed location; *provided*, any owner or owners of real estate along such portion is or are willing to contribute the whole cost and expense thereof; *and provided further*, every owner of land upon that part of said road proposed to be vacated under this act shall consent in writing to such change of location and vacation.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

Change and  
improve  
roads.

1. The board of chosen freeholders of any of the several counties of this State shall have the power and

authority to straighten, change the location of and vacate any portion of any public road or highway heretofore or hereafter acquired, constructed and improved in any such county by the board of chosen freeholders thereof, and to improve the portion included in such changed location; *provided*, any owner or owners of real estate along such portion is or are willing to contribute the whole cost and expenses thereof; *and provided further*, every owner of land upon that part of such road or highway proposed to be vacated under this act shall consent in writing to such change of location and vacation.

Proviso.

2. The property owner or owners desiring such straightening, change of location and vacation, and the improvement of the portion included in such changed location, may present to the board of chosen freeholders of any such county a petition therefor, which shall be accompanied by a map and specifications showing the proposed straightening, change of location and vacation, and in what manner the portion included in such changed location is to be improved, and offering to contribute the whole cost and expense thereof; and said board, if it approve of the same, and is satisfied that every owner of land upon that part of said road or highway proposed to be vacated consents thereto, shall authorize the same; and thereupon it shall be lawful for said board to acquire the land necessary for said change of location, by gift, grant for nominal consideration, or by exchange of said portion so vacated for said portion necessary to be acquired; and said board is empowered, if required in any such exchange, to make, execute and deliver a deed or deeds of conveyance, conveying in fee-simple the title, if any, of any such board to the land so conveyed by it; and it shall be further lawful for said board, upon such terms as it shall determine or as shall be agreed upon with such owner or owners, either to proceed and make the said improvement itself, the whole cost and expense thereof to be paid by said owner or owners or to allow the said owner or owners to make the same themselves, subject to the approval of said board, and after the completion of the same, the portion which shall be superseded by said changed location shall be deemed

Presentation  
by owners.

Map and  
specifica-  
tions.

Power of  
freeholders.

and taken as vacated as a part of said county or public road or highway.

Repealer.

3. All acts and parts of acts inconsistent with this act be and the same are hereby repealed, and this act to be deemed and taken as a public act, to take effect immediately.

Approved March 24, 1903.

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## CHAPTER 90.

An Act to amend an act entitled "An act to provide for the permanent improvement of public roads in this State," approved April first, one thousand nine hundred and three.

*BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:*

Section amended.

I. Amend section ten of the act to which this is an amendment so that it shall read as follows:

Freeholders may issue road improvement bonds.

10. The board of chosen freeholders may, instead of certifying to the county board of assessors the two-thirds cost of any work done under this act, as required by the ninth section of this act, by resolution, adopted by a vote of at least two-thirds of all its members, issue bonds of the county for two-thirds of the estimated cost of said work, which bonds shall be designated as "road improvement bonds," and shall be for such sums and in such amounts, payable in not less than six nor more than thirty years from date thereof, with interest at a rate not exceeding five per centum per annum, payable annually or semi-annually, as said board of freeholders, by said resolution, may determine; said bonds shall be signed by the director of the board of chosen freeholders and by the county collector, sealed with the seal of the board, properly numbered, and a registry thereof kept by the board, and may be either coupon or registered bonds, and, if coupon bonds, the coupons

Time; rate

shall be signed by the director of the board, and shall be numbered to correspond to the several bonds to which they shall be severally attached; the board of freeholders shall, when bonds are issued under the provisions of this section, certify to the county board of assessors, in each and every year so long as any of said bonds remain outstanding, a sum sufficient to pay the interest accruing on said bonds for said year and the principal of any bond or bonds that shall mature in said year, and the said county board of assessors shall include the said sum in the annual tax levy or assessment for said year, and the same shall be collected and paid over in the same manner and at the same time as other county taxes.

Interest and  
principal  
met.

Approved March 28, 1904.

#### CHAPTER 114.

An Act to enable boards of chosen freeholders to accept as county roads, roads or sections of roads, in townships, which have been or shall hereafter be permanently improved without State or county aid.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. Whenever any public road or section of road, located in any township of this State, has been or shall hereafter be permanently improved, without State or county aid, by the construction thereon of a macadamized road, or telford or other stone road, so that the same is or shall be, with reasonable repairs thereto, firm, smooth and convenient for travel at all seasons of the year, and approved by the state commissioner of public roads, such public road or section of road may, upon the petition in writing of the township committee of the township wherein such public road or section of road so improved lies, addressed to and filed with the board of chosen freeholders of the county within which such township is situate, accompanied by a map or survey of the public road or section of road so improved

Roads improved by townships may be transferred to county on petition.

Becomes a  
country road.

and a copy of the specifications under which such improvements were made, together with proofs showing full payment to the contractor or contractors for all work done, be, by said board of chosen freeholders, by resolution, accepted as and declared to be a county road, if in the judgment of said board of freeholders said road is of sufficient public importance; and such public road or section of road shall, upon such acceptance, forever thereafter be a county road and subject to the exclusive jurisdiction of said board of chosen freeholders, in the same manner as roads built by State aid, and the duty of keeping the same in repair shall devolve exclusively upon such board of chosen freeholders.

Petition may  
include.

2. More than one public road or section of road in the same township may be included in one petition.

3. This act shall take effect immediately.

Approved March 28, 1904.

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## CHAPTER 44.

### STATE AID TO TOWNSHIPS.

Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this State," approved March twenty-second, one thousand eight hundred and ninety-five.

*BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:*

When prop-  
erty may  
be assessed  
not to ex-  
ceed 10 per  
cent. for  
road  
benefits.

1. Whenever there shall be presented to the township committee, borough council, board of trustees or commissioners or other governing body of any township, town, borough, village or municipality governed by a board of commissioners, a petition signed by the owners of at least two-thirds in lineal feet of the lands fronting on any public road or section of road in such

township, town, borough, village or municipality, praying such governing body to cause such roads or section to be improved under the act to which this is a supplement, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting on said roads or section shall be assessed thereon, in proportion to the benefits conferred, to an amount not exceeding ten per centum of the entire cost of the improvement, it shall be the duty of such governing body to consider and determine whether the road or section mentioned in such petition is of sufficient general importance to warrant the expenditure necessary for the improvement thereof, and to grant the prayer of such petition or to refuse the same if of opinion that the improvement is not of sufficient public importance, or that the expense thereof will be an unnecessary public burden; and in case the prayer of such petition is granted, then such road shall be improved in the same manner and subject to the same regulations, as far as practicable, as in case where a petition is presented to the board of freeholders of any county under the eighth section of the act to which this is a supplement.

2. The said governing body shall cause all necessary surveys to be made, and specifications to be prepared for a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good material, in such manner that the same will, with reasonable repairs thereto, at all seasons of the year be firm, smooth and convenient for travel, and shall thereafter proceed in the same manner as the board of freeholders is required to proceed by the act to which this is a supplement; and the state commissioner of public roads shall have the same power and authority in respect to the roads authorized by this supplement as by said act are conferred upon him in respect to roads improved under such act.

Construction  
of road;  
supervision.

3. The state commissioner of public roads shall appoint as supervisor of the work such person as shall be nominated by such governing body; such supervisor shall perform the same duties and shall be subject to the same provisions as the supervisor appointed under the act to which this is a supplement, and shall be paid out of the treasury of the township, or other

Supervisor  
of con-  
struction.

municipality, and shall file one copy of the statement required by the third section of the aforesaid act with the township committee or other municipal authority, and the other with the state commissioner of public roads.

Proportion  
of charges,  
how as-  
sumed.

4. The aggregate amount of the peculiar benefits conferred on the lands fronting on any road improved under authority of this supplement, not exceeding ten per centum of the entire cost of the improvement, shall be borne by the owners of the land so benefited, one-third of the cost of the improvement (less so much thereof not exceeding one-tenth as shall be assessed upon the property benefited) shall be paid for out of the state treasury; the remaining two-thirds of such cost shall be borne by the said township, or other municipality within which said road is located.

Assessment  
of benefits.

5. The amount of peculiar benefits conferred by such improvement on lands fronting on such road shall be assessed on the application of the township committee, or other governing body, in the manner prescribed by the act to which this is a supplement, and all proceedings under this supplement shall conform, as far as practicable, to the proceedings authorized and directed by said act, and the said governing body shall, so far as concerns roads constructed by virtue of this supplement, perform the same duties and have the same powers as by said act devolve upon the board of freeholders in respect to roads built under the aforesaid act.

Maintenance  
of roads.

6. Every road constructed under the provisions of this supplement shall thereafter be maintained and kept in repair by the township or other municipality in which such road is situate, in the same manner in all respects as other public roads therein are or may be maintained and kept in repair, and none of the special provisions of the act to which this is a supplement whereby said road shall be a county charge, shall be applicable to roads built by authority of this supplement.

7. This act shall take effect immediately.

Approved March 17, 1899.



CHANGING LOCATION OR IMPROVING.

CHAPTER 75.

An Act to amend an act entitled "An act to provide for the permanent improvement of public roads in this State," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. The eighteenth section of the said act shall be amended so as to read as follows:

18. That if any property owners or owner along any road in any county of this State which has not been improved or is not undergoing improvement under the previous sections of this act shall desire any section of any road in such county to be improved or to be changed in location and improved, and are or is willing to contribute the whole expense of such improvement, and provided every owner of land upon that part of the road proposed to be vacated under this act shall consent in writing to such vacation, the supervisor of roads of such county shall, upon a written request of such owners or owner, make a plan of such sections of roads so to be improved or changed in location and improved, in which shall be given the levels and distances, and also specifications stating the materials that may be used and the manner of using them; and a copy of such plan, location, change of location, specifications and of any bids to do such work shall then be submitted by such owners or owner to the board of chosen freeholders, and if such board shall approve them and any change of location which may be proposed, it shall then be lawful for such owners or owner to accept any bid or bids so approved from among the bidders, or at their own expense to proceed to build such section of road according to such plan, location and specifications, and such owners or owner shall have control of the expenditure of moneys used to make such improvements, subject to the approval and supervision of the super-

Property-owners to contribute whole expense of improvement.

Owner to have control of expenditures.

Old road  
vacated.

visor of such county; and, upon the completion of the improvement to the satisfaction of the said supervisor and said board of chosen freeholders, and upon the submission to said board of receipts showing full payment for materials furnished and work done under the plan and specifications, such section of road so improved shall, if the board of chosen freeholders shall so declare, thereafter be a county road, but otherwise shall remain an ordinary public highway, and any and all portions of any road now existing which may have been rendered unnecessary or be superseded by the new road so constructed shall be vacated and abandoned as a public road, without other action or proceedings than the approval of the board of chosen freeholders as hereinbefore provided; and the said supervisor shall be paid by the aforesaid owners or owner the sum of ten dollars for making the plan, the sum of five dollars for drawing the specifications, and the sum of five dollars for the supervision of the work, and in case such supervisor is not a civil engineer and actual survey is necessary, then such owners or owner, at their or his expense, shall procure a survey, which shall be subject to the approval of such supervisor, which survey shall take the place of the plan before mentioned, and shall include all the new roads proposed to be constructed and all the old roads proposed to be abandoned.

Approved March 23, 1896.

**INCREASED POWER TO BORROW.**

An Amendment to an act entitled "A supplement to an act entitled 'An act to enable boards of chosen freeholders to acquire, improve and maintain public roads,'" approved March nineteenth, one thousand eight hundred and eighty-nine, which supplement was approved April ninth, one thousand eight hundred and ninety-two.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. The first section of an act entitled "A supplement to an act entitled 'An act to enable boards of chosen freeholders to acquire, improve and maintain public roads,'" approved March nineteenth, one thousand eight hundred and eighty-nine, which supplement was approved April ninth, one thousand eight hundred and ninety-two, be amended so as to read as follows:

Section be amended.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. In counties of the second class it shall be lawful to raise a sum not to exceed four hundred thousand dollars, for which bonds may be issued by the board of chosen freeholders of any such county, under the act to which this is a supplement or any supplement or amendment thereof; *provided, however*, that if work under said act and supplements or amendments has already been done to an amount exceeding said sum, bonds under said act and supplements may be issued to an amount sufficient to raise and pay for such work; *and provided also*, that no county road bond shall be issued to such an amount as, in addition to existing debt, shall raise the debt of the county for all purposes above three per centum of the assessed value of the real estate therein; and in case any such bonds shall be issued in excess of the limit aforesaid, all such bonds so issued

Amount authorized to raise and bonds issued.

Proviso.

Proviso.

in excess shall be void in the hands of any person or party, notwithstanding any recitals therein or any representations that may be made concerning the same; in case application has already been made to the circuit court and a certificate shall have been recorded and filed, as required by said act, such application need not be repeated in case of any subsequent issue of such bonds where the original certificate on file shows that the new issue of bonds will not exceed three per centum of the assessed value of the real estate in said county as limited by this act.

2. The second section of said act be amended so as to read as follows:

Board not  
to use  
money  
raised ex-  
cept to  
grade, &c.

2. In any county of the second class wherein the board of chosen freeholders thereof shall heretofore or may hereafter issue bonds under said act and supplements, that such board of such county shall not use any of the money so raised for any other purpose except to grade, macadamize or improve any road in any such county, under the provisions of the act to which this is a supplement and the several supplements and amendments thereof; *provided*, nothing herein shall prohibit the doing of the necessary repair of any road heretofore graded, macadamized or improved by any such board or that may be hereafter graded, macadamized or improved under said act and supplements.

Proviso.

3. All acts and parts of acts inconsistent herewith be and the same are, so far only as they conflict herewith, repealed, and that this act shall take effect immediately.

Approved March 24, 1897.

## CHAPTER 93.

## POWER OF FREEHOLDERS TO BORROW.

A Supplement to an act entitled "An act in relation to county expenditures," approved April second, one thousand eight hundred and seventy-eight.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. In case of the injury or destruction by freshets or otherwise of any of the roads or sections of roads in this State that have become county roads under and by virtue of any law of this State whereby it shall be deemed necessary for the board of chosen freeholders, within the limits of whose county such roads or sections of roads so injured or destroyed may lie, to repair or rebuild the same, the said board of chosen freeholders may order and cause such roads or sections of roads to be repaired or rebuilt, notwithstanding the expense of repairing or rebuilding the same shall exceed the limit of the appropriations made for that year; and such board of chosen freeholders may borrow money on temporary loans for that purpose in anticipation of the next tax levy; and in the said tax levy there shall be incorporated a special appropriation under the head of "debts and interest, special deficiency," to pay for such temporary loans.

Repair of  
roads  
damaged by  
freshets.

Special  
charge.

2. This act shall take effect immediately.

Approved April 2, 1902.

## CHAPTER 100.

A Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this State," approved March twenty-second, one thousand eight hundred and ninety-five.

*BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:*

Boundary  
road or  
street may  
be im-  
proved.

1. Any road or street, or section-of-road or street, which constitutes the boundary line between two counties, may be acquired, improved and maintained in manner provided for in the act to which this act is a supplement.

Freeholders  
adjoining  
counties  
may meet  
to consider  
improve-  
ments.

2. It shall be lawful for the board of chosen freeholders representing adjoining counties which are divided by any road, street or section of road or street, to jointly meet at such time and such place, in either county, as they agree upon, to consider and determine the question of acquiring, improving and maintaining said boundary road or street or section of road or street, according to the provisions of said act, to the best advantage of the public and the owners of property adjacent thereto; and to that end the said joint board are hereby authorized to prepare maps, plans and specifications, subject to the approval of the commissioner of public roads, for said improvement, which they shall deem necessary and proper for said purposes; the said joint board shall have power to employ a competent engineer or surveyor and such other assistance as they may deem necessary, and upon the completion of said maps, plans and specifications, duplicate copies thereof shall be filed in the office of the clerk of each of the counties affected thereby, and in the office of the commissioner of public roads.

Prepare  
maps.

Employ  
engineer.

Make  
contract.

3. The said joint board may adopt a resolution directing the improvement, as provided for in said act, to be made, and thereupon said joint board shall have

full power and authority to enter into contracts with responsible persons for doing the work and furnishing the necessary materials therefor; they shall advertise for proposals in at least two newspapers published in each county, for at least three weeks, and their contracts shall be awarded to and made with the lowest responsible bidder who will comply with the requirements of the joint board and will give ample security for doing the work and performing the contract, but said joint board shall be under no obligation to accept the lowest bid, in which case all other bids will be thrown out and new proposals advertised for in the manner hereinbefore provided.

4. The said joint board shall, on the certificate of the engineer and surveyor, and on such other evidence as they may require as to the work done and materials used and furnished for said improvement, order payments to be made to the contractor or contractors in the manner provided in said act. Payment.

5. All costs and expenses incurred in the proceedings hereinbefore authorized shall be borne and paid by each county in equal proportion, and the said joint board shall, after the completion of the contract and acceptance of the improvement, divide the road into two equal sections, and shall designate the section which each county shall maintain and keep in repair, and therefore each of said counties shall maintain and keep in repair the sections of the road so assigned to it. Expenses  
equally  
divided.

6. Said joint board may choose a chairman and secretary and such other officers, and may make such rules for government as shall be deemed advisable; the said joint board shall have power to meet and adjourn from time to time, and as often as in their judgment it shall be deemed necessary to fully carry into effect the provisions of this act; the votes of a majority of the members of the board of each county voting separately shall be necessary to decide any question, order, motion or resolution which may come before the said joint board; the secretary of said joint board and the engineer and supervisor appointed shall receive such compensation for their services as the said joint board shall, as aforesaid, determine to be just and proper; the Method of  
transacting  
business by  
joint board.

Compensation.

members of said board shall be entitled to the same compensation as is allowed to them as members of the board of chosen freeholders, and shall comply with the provisions of and receive the benefits from the act to which this is a supplement, as far as the same is consistent and practical.

7. This act shall take effect immediately.

Approved March 23, 1898.

## CHAPTER 132.

An Act to provide for the acquirement of turnpike roads for free public use, and for the permanent improvement and maintenance of the same.

*BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:*

Acquirement  
of turnpike  
road for  
free public  
use.

1. Whenever there shall be presented to the State commissioner of public roads a petition signed by the owners of at least two-thirds of the land and real estate fronting or bordering on any turnpike road, praying that said road may be acquired for free public use, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting or bordering on said road shall be assessed thereon to an amount not exceeding ten per centum of the entire purchase price of the said road, together with the amount necessary to resurface, rebuild or improve the said road in the manner prescribed for other roads in the act entitled "An act to provide for the permanent improvement of the public roads in this State," approved March twenty-second, anno domini one thousand eight hundred and ninety-five, and the supplements thereto, said commissioner shall thereupon notify the governor of such action, and the governor shall thereupon appoint five commissioners from the county or counties through which the said road runs; the said commissioners when appointed shall take an oath or affirmation faithfully and fairly to perform their duties, and shall thereupon

Appoint-  
ment of  
commission-  
ers by  
governor.



proceed to estimate and determine the fair and just value of the said road and of the portions thereof in each county in which the same is located; having given ten days' notice of the time and place when and where they will meet to hear any representation in behalf of the said corporation or of the board or boards of chosen freeholders of the various counties through which the said road runs, or of the applying freeholders in the said matter; said notice shall be served upon the president or other chief officer of the turnpike company, upon the director of the said board or boards of chosen freeholders, and shall be published at least one week prior to the time of meeting in one newspaper published in each county through which said turnpike runs; such meeting shall be adjourned from time to time at the discretion of the said commissioners; when the said commissioners shall have arrived at a price or value of the said turnpike road satisfactory to themselves they shall report the same to the state commissioner of public roads, who may thereupon ratify the same and report it to the board or boards of chosen freeholders of the counties through which the said road runs, which said board may thereupon purchase the same or whenever the board of chosen freeholders of any county in this state shall agree with the owner or owners of any turnpike road or toll road within such county upon the price to be paid for such turnpike road or toll road, and shall by resolution accept the same, and said proceeding be approved by the state commissioner of public roads in writing, said board may thereupon purchase the same and said road shall be paid for and maintained as a county road as hereinafter provided for; and they are hereby empowered to make temporary loans upon the credit of the said county or counties for the acquirement of the said roads as aforesaid.

Hearing.

Report to state commissioner of roads.

2. One-third of the cost of all roads so acquired, together with one-third of the amount expended in improving the same as aforesaid, which improvement shall be made in the manner prescribed for the roads under the aforesaid act, shall be paid for out of the State road appropriation; *provided*, that the amount so paid shall not in one year exceed the amount of

One-third paid from state appropriation.

Proviso.

forty thousand dollars; if one-third of such cost shall exceed the sum of forty thousand dollars, the said sum of forty thousand dollars shall be appropriated by the governor and State commissioner of public roads among the counties of this state in proportion to the cost of the roads acquired by them for such year as shown by the statement of cost filed in the office of the state commissioner of public roads; the governor and the said commissioner shall, between December fifteenth and thirty-first in each year, certify to the state comptroller the amount to be paid to each county for such year, and the state comptroller shall thereupon draw his warrants in favor of the respective county collectors for the sums certified to as aforesaid upon the state treasurer, who shall pay the same out of any moneys in the state treasury not otherwise appropriated; *provided further*, that the cost of all turnpike roads acquired under this act in any county in any one year, together with all roads built or repaired, shall not exceed one-half of one per centum of the ratables of such county for the last preceding year.

Proviso.

Duty of  
county  
board of  
assessors.

3. On or before August first in each and every year it shall be the duty of the board of chosen freeholders to certify to the county board of assessors, either in the annual tax budget or separately, the two-thirds of the cost of purchasing and improving of all turnpike roads acquired and improved as aforesaid during the year, and the county board of assessors shall include the sum so certified in the county tax assessed for such year, and the same shall be assessed, collected and paid over to the county in the same manner and within the same time that other county taxes are assessed, collected and paid over; if a deficiency shall exist in consequence of the receipt of less than one-third of the cost from the State treasury, the board of chosen freeholders shall have authority to borrow on temporary loans to the amount of such deficiency until the next annual taxes shall be assessed, collected and paid over to the county.

Loan to  
meet  
deficiency.

When  
turnpike  
in two or  
more  
counties.

4. If the said road shall run through more than one county, the petition to the state commissioner of public roads shall be signed by at least two-thirds of the owners of the land and real estate bordering on said road

in each county before the governor shall be required to appoint the five commissioners mentioned in the first section of this act; and each of the said counties shall bear the expense of the acquirement of the said road in proportion to the value thereof within the said counties, and all proceedings after the appointment of the said five commissioners that may be required by virtue of this act shall be had separately and independently in each of the said counties.

5. Any road so acquired shall forever thereafter be a free county road, and shall be kept in good order and repair and in the same manner as are other county roads.

Mainten-  
ance.

6. When the said turnpike roads shall have been so acquired and improved by petition as aforesaid the board of chosen freeholders shall apply to the circuit court of the county for the appointment of commissioners to estimate and to assess the peculiar benefits conferred by such acquirement and improvement upon the lands and real estate bordering on the road so acquired and improved, of the time and place of which application notices shall be given by ten days' publication in two daily newspapers printed and circulating within the said counties, or by four weeks' publication in two weekly newspapers printed and circulating therein, at which time and place, or such other time and place as the court shall designate, shall, without unnecessary delay, appoint three commissioners, who shall be freeholders and residents of the county in which the application is made, to assess the benefits aforesaid; the said court shall have power to remove any commissioner and appoint another in his place, and also fill any vacancy that may occur in the office of any commissioner at any time.

Assessment  
of benefits.

7. The said commissioners shall then proceed in like manner as the commissioners appointed to assess the benefits conferred by the improvement of the public roads of this State under and by virtue of an act of the Legislature entitled "An act to provide for the permanent improvement of the public roads of this State," approved March twenty-second, one thousand eight hundred and ninety-five, and supplements thereto, and

Manner of  
assessment.

Report a  
lien.

the report of the said commissioners when filed and approved shall be a lien upon the properties assessed in like manner, and the said assessment shall be collected in like manner as the assessment in the said act last before mentioned.

8. This act shall take effect immediately.

Approved March 22, 1901.

### VACATION OF TURNPIKE.

#### SUPPLEMENT.

Approved February 13, 1884.

Deed of cession and transfer of turnpike road, how executed and filed.

Sec. 1. That whenever any turnpike company of this state shall execute to any city, township or other municipality of this state, a deed of cession and transfer of all or any part of any turnpike road lying within the limits of any such city, township or other municipality, and shall have the same duly proven in the manner required for the proof of deeds or conveyances of lands, and shall deliver the same, together with a map or survey of the road, or of the part of road so ceded and transferred to the common council, township committee or other governing board of such city, township or other municipality, and the said common council, township committee or other governing board shall accept the said deed of cession and transfer, by a writing indorsed thereon, the said deed, proof, map or survey and acceptance shall then be recorded in the office of the clerk of the county in which the road so ceded and transferred lies, in the book containing the records of public roads for said county, and after being so recorded shall be filed in the office of the secretary of state; *provided*, that where the charter or act of incorporation of any city or other municipality prescribes the manner in which deeds of dedication of lands for public highways or streets shall be accepted, the proceedings for the acceptance of any deed of cession and transfer by a turnpike company as aforesaid shall, in any such city or other municipality, be the same as is

Proviso.

required for the acceptance of a deed of dedication of lands for a public highway or street.

Sec. 2. That any turnpike company making a cession and transfer of any part of their turnpike road in the manner aforesaid, shall from the date of filing the deed of cession and transfer in the office of the secretary of state, be released and discharged from all authority and control over the part or parts of their road so ceded and transferred, and from all liability on account of the same, and the same shall thereafter be to all intents and purposes a public road or highway in such city, township or other municipality, and be subject to the same jurisdiction, authority and control by such city, township or other municipality as it has over other public roads or highways within the limits thereof.

Company released from control, &c., of part of road ceded when deed is filed in office of secretary of state.

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An Act authorizing turnpike companies to vacate or dispose of a portion of its road and property.

Approved April 20, 1885.

Sec. 1. That when any turnpike company in this State may deem it advisable to dispose or vacate any portion of their road not in excess of one-half of its entire length, they shall hereby have the power and privilege of so doing at any time when the same may be favored by a vote represented by those owning two-thirds of the capital stock of said company, to be voted at a special meeting of said stockholders called by the officers of said company, and the notice of said meeting being published in at least one newspaper in each county where said road is located, for the space of thirty days, once in each week, said notice to state the time and object of said meeting; the said stockholders may, by a vote represented by those owning two-thirds of the capital stock of said company, authorize and empower their president and secretary to sell or vacate to the freeholders of the county or counties the portion so desired; and if vacated without compensation, a committee of the board of freeholders of the county or counties may view the same and report to the said board upon what terms they have agreed to take said

When turnpike company may vacate or dispose of portion of road.

road, and the action of a majority of said board of freeholders in accepting or rejecting said report shall be final.

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An Act to authorize turnpike companies to abandon a portion of their roads and property.

Passed June 1, 1886.

Turnpike  
companies  
may abandon  
portion  
of road.

Sec. 1. That any turnpike company in this State may abandon any portion of their road not exceeding two-thirds of the entire length of the road, when the same may be favored by a vote of those owning a majority of the capital stock of said company; the resolution to abandon a portion of said turnpike shall describe the part so abandoned, and shall be signed by the president and secretary of said turnpike company, duly acknowledged before an officer authorized to take the acknowledgment of deeds in this State, and shall thereupon be recorded in the office of the clerk of the county wherein such turnpike company is situated; *provided*, that the part of said turnpike so abandoned shall be in all respects in as good repair as when the said company began operating the same.

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#### BROAD TIRES.

#### CHAPTER 76.

An Act to amend an act entitled "An act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes."

I. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That section one of an act entitled "An act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes," approved March sixteenth, one thousand eight hundred and ninety-three, which reads as follows:

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when in their judgment it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise, produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; *provided*, the said rebate shall not exceed fifty cents for each wheel in use in any one year," be and the same is hereby amended so as to read as follows:

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when, in their judgment, it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise, produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; *provided*, the said rebate shall not exceed one dollar, for each wheel in use in any one year.

2. That this act shall take effect immediately.

Passed March 24, 1896.

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## CHAPTER 63.

A Supplement to an act entitled "An act to provide for the acquirement of turnpike roads for free public use," approved May eleventh, one thousand eight hundred and ninety-seven.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. The pay of the commissioners heretofore or hereafter appointed under said act shall be a sum not ex- Compensation.

ceeding five dollars per day, and necessary expenses not exceeding two dollars per day, for actual number of days employed in such service.

Settlement  
when road  
not ac-  
cepted.

2. If the freeholders of the county or counties fail to accept the turnpike roads appraised under the act to which this is a supplement within twelve months after the commission have submitted their award to the state road commissioner, the bill of said commissioners, upon the approval of the state road commissioner and the signature of the governor, shall be presented to the comptroller of the state, who thereupon shall draw his warrant therefor upon the state treasurer, who shall pay the same out of the annual state appropriation for roads.

3. This act shall take effect immediately.

Approved March 20, 1900.

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## CHAPTER 133.

A Supplement to an act entitled "An act to provide for the acquirement of turnpike roads for free public use, and for the permanent improvement and maintenance of the same," approved March twenty-second, one thousand nine hundred and one.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. When any commissioner heretofore or hereafter appointed under the act to which this act is a supplement shall die pending the proceedings under the said act to which this act is a supplement or shall be disqualified or shall be unable to act or shall fail or refuse to act and perform the duties of his appointment, the other four commissioners appointed under said act shall proceed to perform the duties of their appointment with the same powers and effect as if all the commissioners were acting, and a report signed by the other four of said commissioners shall have the



same force and effect as a report signed by all of the commissioners appointed under the said act, and a majority of said commissioners shall have power to adjourn their meetings from time to time.

2. When any commissioner heretofore appointed under the act to which this act is a supplement shall have died pending the proceedings under the said act, or shall have been disqualified or unable to act or shall have failed or refused to act and to perform the duties of his appointment or to attend the meetings of the commissioners appointed under the said act, all the proceedings heretofore had and acts heretofore performed by the other four of the commissioners appointed under the said act are hereby confirmed and made valid, legal and effectual to the same extent that the same would have been valid, legal and effectual if all the commissioners appointed under the said act had taken part in all of said proceedings.

3. This act shall take effect immediately.

Approved March 28, 1904.

## CHAPTER 138.

A Further Supplement to an act entitled "An act to provide for the control and operation of roads and bridges owned or claimed to be owned by any plank road company whose charter has expired or may expire," approved March twenty-second, one thousand nine hundred and one.

*BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:*

1. After such road shall have been acquired and taken possession of by any board or boards of chosen freeholders of any county or counties in this State, such road may be widened to any width not exceeding one hundred feet, providing the board or boards of chosen

widening  
plank roads  
acquired by  
county.

freeholders of the county or counties in which said road may lie and be situate shall adopt a resolution determining that such widening is of public importance, and setting forth the width proposed and the location of said widening, and the points between which such widening is to be made; such resolution, in case said road lies in two or more counties, shall receive the approval of each of said counties before the same shall be valid and operative.

Acquirement  
of lands.

2. The title to the lands required for such widening may be acquired by gift, devise, purchase or condemnation, and shall vest in the county corporation of the county or counties within the territorial limits of which the lands acquired may lie, respectively, and the cost and expense of acquiring such lands shall be paid by the county within which the same shall lie; but nothing in this act contained shall be construed to alter or in any wise affect the provisions of law under which such road, including the bridges thereof, are or shall be constructed, renewed, repaired or maintained.

3. This act shall take effect immediately.

Approved March 28, 1904.

## CHAPTER 98.

Further Supplement to an act entitled "An act concerning roads," approved April sixteenth, eighteen hundred and forty-six.

*BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:*

Highway  
must be  
kept clear  
of weeds,  
&c.

1. The owner or occupant of land abutting on any highway in any township in this State shall, during the month of September of each year, cut and remove all brush, briars and weeds growing in or upon such portion of such highway as his or her lands abut upon, and in case such owner or occupant shall fail to perform

the duty imposed hereby, the township committee of the township in which such lands abut as aforesaid shall cause such work to be done and the owner of such lands shall pay the expense thereof, with costs, to be recovered in an action upon contract before any justice of the peace of the county at the suit of such township committee.

2. This act shall take effect immediately.

Approved March 23, 1900.

An Act for the better protection of travelers, pedestrians, vehicles and animals on the public streets and highways.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. Whoever places upon the surface of any public street, highway or other way customarily and lawfully used for public travel, or upon any sidewalk appurtenant to such way, any broken glass, bottle, metal, loose stones, earthenware, or other substance of a nature likely to cause injury to travelers or pedestrians, or to carriages, bicycles or other vehicles traveling or moving on said way, or which might wound, disable or injure any horse or other animal, or which might injure, cut or puncture any pneumatic tire, shall forfeit for each offense five dollars, to be sued for and recovered in an action of debt by any person who will sue for the same.

Penalty for placing glass, bottles, &c., upon public highways.

2. Any overseer of the highways, committeeman, contractor, or other person whomsoever, who shall place or spread broken stone on any of the highways of this State, for the purpose of improving or repairing the same, shall, if such stone be of the dimension of an inch and one-half or more in diameter, cause the same to be covered with fine stone, earth or screenings, within such period of time as it shall be possible to obtain such fine stone, earth or screenings after said

Broken stone of dimension one inch or more placed on highways to be covered.

## ELEVENTH ANNUAL REPORT.

broken stones are spread upon said road, unless prevented by causes beyond his control, under a penalty of twenty dollars for each offense, to be sued for in an action of debt and recovered with costs by any person who shall be injuriously affected by the willful neglect or failure to cover said stone as herein provided.

3. This act shall take effect immediately.

Approved May 12, 1896.

## APPENDIX C.

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### NEW JERSEY.

1. All taxes are to be paid in money.
2. The office of overseer of highway is abolished.
3. The roads of a township are placed under the management of the township committee, and money may be raised by township bonds for grading, macadamizing and improving the same; bonds to be authorized by vote at the annual town meeting.

4. Under the County Act, the board of chosen freeholders of any county may designate certain roads as county roads, and improve the same by the issue of county bonds; townships to pay one-third of the cost.

5. Under the new County State Aid law, the freeholders may declare any road a county road, and by resolution improve same, or whenever the owners of two-thirds of the lands fronting on any public road petition for same the freeholders can require the township in which the road lies to pay one-tenth of the cost of improving such road, the State paying one-third of the cost up to, at present, the limit of \$250,000 per year.

This act extends to townships, towns, boroughs, villages or any municipality or municipalities, all proceedings conforming, as near as possible, to the provisions of this act, and the governing bodies of any township, town, borough, village or municipality shall have the same power and perform the same duties as are conferred and devolve upon the board of chosen freeholders under the provisions of this act.

6. Under the act for the acquirement of turnpike roads for free public use, whenever the owners of two-thirds of the land fronting on any turnpike toll road

pray that said road may be acquired for free public use, and that they are willing to pay ten per cent. of the entire cost of such road, the governor appoints five commissioners to estimate and determine the fair and just value of said road; after having arrived at such value, if the state road commissioner ratifies the same, the board may purchase, the state paying one-third of the cost and the county paying the balance, two-thirds, or whenever the board of chosen freeholders of any county in this state shall agree with the owner or owners of any turnpike road or toll road within such county upon the price to be paid for such turnpike road or toll road, and shall by resolution accept the same, and said proceeding be approved by the state commissioner of public roads in writing, said board may thereupon purchase the same.

7. Whenever the board of chosen freeholders purchases a turnpike road and the state commissioner of public roads approves of the same, the state pays one-third of the cost.

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#### LAYING OUT ROADS.

Receiving many inquiries how to proceed to lay out roads, change location, etc., to save correspondence we give the following quotations from the statutes:

*Laying out Roads by Frecholders after Gcneral Election.*

It shall be lawful for the board of chosen freeholders of any of the several counties of this State when said board deem it for the best interests of such county, to lay out, construct and maintain public roads extending through such county in any direction, to submit, by resolution, the question whether or not such public roads shall be laid out, to the electors of said

county, at an election, to be held at the same time and place of holding the general election in and for said county for members of the General Assembly of this State, by the same officers, but in separate ballot-box, and if, at such election, a majority of the electors shall vote "against public roads," nothing in this act shall apply or be effective in said county; but if a majority of the electors vote "in favor of public roads," then the board shall proceed as directed by the act entitled "An act to authorize the board of chosen freeholders of any of the several counties of this State to lay out, open, construct, improve and maintain a public road therein," approved April 7th, 1888. P. L. 1888, page 397.

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LAYING OUT, VACATING OR ALTERING PUBLIC ROADS BY  
SURVEYORS OF HIGHWAYS. (Revised Statutes,  
page 2828-119, Sec. 1.)

That when ten or more persons, being freeholders, shall think a public road necessary, or any public road which hath been or shall be laid out unnecessary, or any alteration in such road necessary in any part of the county in which they reside, it shall be lawful for the said persons to make application in writing to the inferior court of common pleas of the said county, in open court, having given previous notice for at least ten days of such intended application, and also of the day on which such application is intended to be made, by advertisements under their hands, and set up at three of the most public places in the township in which the said road is proposed to be laid out, vacated or altered, and if there be more townships than one through which the said road may run by advertisements to be set up at three of the most public places in each township; and the said court, when applied to as aforesaid, on due proof being made that the advertisements have been set up according to law, on which the judgment of the court shall be final and conclusive,

are hereby authorized and required to appoint six of the surveyors of the highways of the said county, ever having regard to the appointment of the surveyors of the highways of the township or townships where the said road shall be so applied for to be laid out, vacated or altered; *provided*, that no surveyor shall be appointed through whose land the road may run, or who for any other reason which the court in their discretion shall deem sufficient, think ought not to be appointed; and the said surveyors shall meet at such time and place as the said court shall direct, a copy of which appointment shall be served on each of the said surveyors at least six days prior to the time of their meeting; and two of the said applicants shall, at least twelve days prior to the said time, sign and set up advertisements at three of the most public places in the said township or townships, setting forth the time and place of the meeting of the surveyors agreeably to the directions of the court, and designating the points or places from and to which the said road is proposed to be laid out, vacated or altered. (See Secs. 138 and 168, *post*.)

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VACATING AND RELAYING OF PUBLIC ROADS BY FILING  
CONSENT WITH CLERK AND RECORDING.

138. Sec. 1. That whenever ten or more persons, being freeholders, shall think any alteration of any public road necessary in any part of the county where-in they reside, by having such road or a portion thereof vacated, and the same relaid or another road substituted therefor, they may make application in writing to the inferior court of common pleas of such county, or to one of the judges thereof, setting forth in writing the road or portion thereof as aforesaid which it is proposed to have vacated, describing the same by courses and distances, and also describing the road as it is to be relaid, or the road which is to be substituted therefor, to which description there shall be attached a map showing the location of the road or portion of the road to be vacated and the road as relaid, or the



road which is to be substituted therefor; and if within ten days after such application shall have been made as aforesaid, or if at the time of making such application there shall be presented to said court or judge the consent in writing of the owners of all the lands intersected by such old road or portion thereof proposed to be vacated, and of all the property intersected by the road as proposed to be relaid, or by the road which it is proposed to substitute therefor, and also the written consent of the township committee of the township wherein such road or roads do lie, that said application shall be granted, then it shall be lawful for said court or judge to cause said application, with the accompanying survey, map and return, and the written consents of the owners of lands as aforesaid, and of the township committee, to be filed with the clerk of the county, to be by him recorded in the book of roads for said county; and when said application and other papers shall have been so filed, such old road or portion thereof shall thereupon and thereby be deemed to be vacated, and the road as relaid, or the new road substituted therefor, shall thereupon and thereby be deemed and taken to be a public road.

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VACATION OF PUBLIC ROADS BY CONSENT AND FILING  
WITH COUNTY CLERK.

186. Sec. 1. That whenever ten or more persons, being freeholders, shall think the vacation of a part of any public road necessary in any part of the county wherein they reside, they may make application in writing to the inferior court of common pleas of such county, or to one of the judges thereof, setting forth in writing the road or portion thereof which it is proposed to have vacated, describing the same by courses and distances, to which description there shall be attached a map showing the location of the road, or portion thereof to be vacated, and if within ten days after such application shall have been made as aforesaid, or if at the time of making such application, there shall be

presented to said court or judge the consent in writing of the owners of all the lands by such old road or portion thereof proposed to be vacated, and also the written consent of the township committee of the township wherein such lands do lie, that such application shall be granted, then it shall be lawful for said court or judge to cause said application, with the accompanying survey, map and return, and the written consents of the owners of lands as aforesaid, and of the township committee to be filed with the clerk of the county, to be by him recorded in the book of roads for said county, and when said application and papers have been so filed, such portion of such old road shall thereupon and thereby be deemed to be vacated; *provided*, that no portion of any old road proposed to be vacated under this act shall exceed one thousand yards in length.

## APPENDIX D.

Number of tons of stone per mile required to build the following depths and widths.

For the information of intending road builders, we have compiled the following tables, which approximate the number of tons of thoroughly-rolled stone necessary to construct each mile at the designated depth and widths.

The basis is 3,000 tons of loose stone or 3,500 tons of compressed stone for a road one mile long, sixteen feet wide and eight inches deep. A road eight inches deep, when finished, will have required at least ten inches of stone. It should be placed in two layers of five inches each, and each layer rolled down to four inches. Then the application of the three-quarter inch and screenings will bring the road to the prescribed depth; for other thickness the stone should be placed in proportion to the intended finished depths.

An observance of this rule will insure the contract thickness for the roadbed, and save the sometimes necessary expense of resurfacing before acceptance from the contractor.

A road 8 ft. wide and 4 in. deep will require 875 tons of stone per mile.								
"	8	"	6	"	"	1,312½	"	"
"	8	"	8	"	"	1,750	"	"
"	8	"	10	"	"	2,187½	"	"
"	8	"	12	"	"	2,625	"	"
"	9	"	4	"	"	984 3-8	"	"
"	9	"	6	"	"	1,476 9-16	"	"
"	9	"	8	"	"	1,968¾	"	"
"	9	"	10	"	"	2,460 15-16	"	"
"	9	"	12	"	"	2,953 1-8	"	"
"	10	"	4	"	"	1,093 ¾	"	"
"	10	"	6	"	"	1,640 5-8	"	"
"	10	"	8	"	"	2,187½	"	"
"	10	"	10	"	"	2,734 3-8	"	"
"	10	"	12	"	"	3,281¼	"	"
"	11	"	4	"	"	1,203 1-8	"	"
"	11	"	6	"	"	1,804 11-16	"	"
"	11	"	8	"	"	2,406¼	"	"
"	11	"	10	"	"	3,007 13-16	"	"
"	11	"	12	"	"	3,609 3-8	"	"

A road 12 ft. wide and 4 in. deep will require 1,312  $\frac{1}{2}$  tons of stone per mile.

"	12	"	"	6	"	"	1,968 $\frac{3}{4}$	"	"	"
"	12	"	"	8	"	"	2,625	"	"	"
"	12	"	"	10	"	"	3,281 $\frac{1}{4}$	"	"	"
"	12	"	"	12	"	"	3,937 $\frac{1}{2}$	"	"	"
"	13	"	"	4	"	"	1,421 7-8	"	"	"
"	13	"	"	6	"	"	2,132 13-16	"	"	"
"	13	"	"	8	"	"	2,843 $\frac{3}{4}$	"	"	"
"	13	"	"	10	"	"	3,554 11-16	"	"	"
"	13	"	"	12	"	"	4,265 5-8	"	"	"
"	14	"	"	4	"	"	1,531 $\frac{1}{4}$	"	"	"
"	14	"	"	6	"	"	2,296 7-8	"	"	"
"	14	"	"	8	"	"	3,062 $\frac{1}{2}$	"	"	"
"	14	"	"	10	"	"	3,828 1-8	"	"	"
"	14	"	"	12	"	"	4,593 $\frac{3}{4}$	"	"	"
"	15	"	"	4	"	"	1,640 5-8	"	"	"
"	15	"	"	6	"	"	2,460 15-16	"	"	"
"	15	"	"	8	"	"	3,281 $\frac{1}{4}$	"	"	"
"	15	"	"	10	"	"	4,101 9-16	"	"	"
"	15	"	"	12	"	"	4,921 7-8	"	"	"
"	16	"	"	4	"	"	1,750	"	"	"
"	16	"	"	6	"	"	2,625	"	"	"
"	16	"	"	8	"	"	3,500	"	"	"
"	16	"	"	10	"	"	4,375	"	"	"
"	16	"	"	12	"	"	5,250	"	"	"
"	17	"	"	4	"	"	1,859 3-8	"	"	"
"	17	"	"	6	"	"	2,789 1-16	"	"	"
"	17	"	"	8	"	"	3,718 $\frac{3}{4}$	"	"	"
"	17	"	"	10	"	"	4,648 7-16	"	"	"
"	17	"	"	12	"	"	5,578 1-8	"	"	"
"	18	"	"	4	"	"	1,968 $\frac{3}{4}$	"	"	"
"	18	"	"	6	"	"	2,953 1-8	"	"	"
"	18	"	"	8	"	"	3,937 $\frac{1}{4}$	"	"	"
"	18	"	"	10	"	"	4,921 7-8	"	"	"
"	18	"	"	12	"	"	5,906 $\frac{1}{4}$	"	"	"
"	19	"	"	4	"	"	2,078 1-8	"	"	"
"	19	"	"	6	"	"	3,117 3-16	"	"	"
"	19	"	"	8	"	"	4,156 $\frac{1}{4}$	"	"	"
"	19	"	"	10	"	"	5,195 5-16	"	"	"
"	19	"	"	12	"	"	6,234 3-8	"	"	"
"	20	"	"	4	"	"	2,187 $\frac{1}{2}$	"	"	"
"	20	"	"	6	"	"	3,281 $\frac{1}{4}$	"	"	"
"	20	"	"	8	"	"	4,375	"	"	"
"	20	"	"	10	"	"	5,468 $\frac{3}{4}$	"	"	"
"	20	"	"	12	"	"	6,562 $\frac{1}{2}$	"	"	"

## TABLES.

As many persons interested in the construction of stone roads are asking questions about their cost, we enclose a table to show at a glance the number of square yards at different widths in a mile of road; also the cost at different widths and various prices per square yard. Any variations from these prices can be quickly ascertained by adding, subtracting, multiplying and dividing for a less or greater width. For example, a road eight feet wide has 4,693 1-3 square yards in one mile. To obtain the number of square yards in a road having a width of nine feet, add one-eighth to the foregoing figures, and in one having a width of seven feet, subtract one-eighth; in one of twice the width given in the table multiply by two.

## SQUARE YARDS IN ONE MILE OF

8 feet in width	4,693 1-3 square yards.
10 "	5,866 2-3 "
12 "	7,040 "
14 "	8,213 1-3 "
16 "	9,386 2-3 "
18 "	10,560 "

8 feet wide, or 4,693 1-3 square yards, at 25c. per yard	\$1,173 33 1-3
10 " 5,866 2-3 " 25c. "	1,466 66 2-3
12 " 7,040 " 25c. "	1,760 00
14 " 8,213 1-3 " 25c. "	2,053 33 1-3
16 " 9,386 2-3 " 25c. "	2,346 66 2-3
18 " 10,560 " 25c. "	2,640 00
8 " 4,693 1-3 " 30c. "	1,408 00
10 " 5,866 2-3 " 30c. "	1,760 00
12 " 7,040 " 30c. "	2,112 00
14 " 8,213 1-3 " 30c. "	2,464 00
16 " 9,386 2-3 " 30c. "	2,816 00
18 " 10,560 " 30c. "	3,168 00
8 " 4,693 1-3 " 35c. "	1,642 66 2-3
10 " 5,866 2-3 " 35c. "	2,053 33 1-3
12 " 7,040 " 35c. "	2,464 00
14 " 8,213 1-3 " 35c. "	2,874 66 2-3
16 " 9,386 2-3 " 35c. "	3,285 33 1-3
18 " 10,560 " 35c. "	3,696 00
8 " 4,693 1-3 " 40c. "	1,877 33 1-3
10 " 5,866 2-3 " 40c. "	2,346 66 2-3
12 " 7,040 " 40c. "	2,816 00
14 " 8,213 1-3 " 40c. "	3,285 33 1-3
16 " 9,386 2-3 " 40c. "	3,754 66 2-3
18 " 10,560 " 40c. "	4,224 00

8 feet wide, or 4,693 1-3 square yards, at 45c. per yard.....						2,112	00
10	"	5,866 2-3	"	45c.	"	2,640	00
12	"	7,040	"	45c.	"	3,168	00
14	"	8,213 1-3	"	45c.	"	3,696	00
16	"	9,386 2-3	"	45c.	"	4,224	00
18	"	10,560	"	45c.	"	4,752	00
8	"	4,693 1-3	"	50c.	"	2,346	66 2-3
10	"	5,866 2-3	"	50c.	"	2,933	33 1-3
12	"	7,040	"	50c.	"	3,520	00
14	"	8,213 1-3	"	50c.	"	4,106	66 2-3
16	"	9,386 2-3	"	50c.	"	4,693	33 1-3
18	"	10,560	"	50c.	"	5,280	00
8	"	4,693 1-3	"	55c.	"	2,581	33 1-3
10	"	5,866 2-3	"	55c.	"	3,226	66 2-3
12	"	7,040	"	55c.	"	3,872	00
14	"	8,213 1-3	"	55c.	"	4,517	33 1-3
16	"	9,386 2-3	"	55c.	"	5,162	66 1-3
18	"	10,560	"	55c.	"	5,808	00
8	"	4,693 1-3	"	60c.	"	2,816	00
10	"	5,866 2-3	"	60c.	"	3,520	00
12	"	7,040	"	60c.	"	4,224	00
14	"	8,213 1-3	"	60c.	"	4,928	00
16	"	9,386 2-3	"	60c.	"	5,632	00
18	"	10,560	"	60c.	"	6,336	00
8	"	4,693 1-3	"	65c.	"	3,050	66 2-3
10	"	5,866 2-3	"	65c.	"	3,813	33 1-3
12	"	7,040	"	65c.	"	4,576	00
14	"	8,213 1-3	"	65c.	"	5,338	66 2-3
16	"	9,386 2-3	"	65c.	"	6,101	33 1-3
18	"	10,560	"	65c.	"	6,864	00
8	"	4,693 1-3	"	70c.	"	3,285	33 1-3
10	"	5,866 2-3	"	70c.	"	4,106	66 2 3
12	"	7,040	"	70c.	"	4,928	00
14	"	8,213 1-3	"	70c.	"	5,749	33 1-3
16	"	9,386 2-3	"	70c.	"	6,570	66 2-3
18	"	10,560	"	70c.	"	7,392	00
8	"	4,693 1-3	"	75c.	"	3,520	00
10	"	5,866 2-3	"	75c.	"	4,400	00
12	"	7,040	"	75c.	"	5,280	00
14	"	8,213 1-3	"	75c.	"	6,160	00
16	"	9,386 2-3	"	75c.	"	7,040	00
18	"	10,560	"	75c.	"	7,920	00

# COMMISSIONER OF PUBLIC ROADS.

211

8 feet wide, or 4,693 1-3 square yards, at 80c. per yard.....						3,754	66 2-3
10	"	5,866 2-3	"	80c.	"	4,693	33 1-3
12	"	7,040	"	80c.	"	5,632	00
14	"	8,213 1-3	"	80c.	"	6,570	66 2-3
16	"	9,386 2-3	"	80c.	"	7,509	33 1-3
18	"	10,560	"	80c.	"	8,448	00
8	"	4,693 1-3	"	85c.	"	3,989	33 1-3
10	"	5,866 2-3	"	85c.	"	4,986	66 2-3
12	"	7,040	"	85c.	"	5,984	00
14	"	8,213 1-3	"	85c.	"	6,981	33 1-3
16	"	9,386 2-3	"	85c.	"	7,978	66 2-3
18	"	10,560	"	85c.	"	8,976	00
8	"	4,693 1-3	"	90c.	"	4,224	00
10	"	5,866 2-3	"	90c.	"	5,280	00
12	"	7,040	"	90c.	"	6,336	00
14	"	8,213 1-3	"	90c.	"	7,392	00
16	"	9,386 2-3	"	90c.	"	8,448	00
18	"	10,560	"	90c.	"	9,504	00
8	"	4,693 1-3	"	95c.	"	4,458	66 2-3
10	"	5,866 2-3	"	95c.	"	5,573	33 1-3
12	"	7,040	"	95c.	"	6,688	00
14	"	8,213 1-3	"	95c.	"	7,802	66 2-3
16	"	9,386 2-3	"	95c.	"	8,917	33 1-3
18	"	10,560	"	95c.	"	10,032	00
8	"	4,693 1-3	"	\$1 00	"	4,693	33 1-3
10	"	5,866 2-3	"	1 00	"	5,866	66 2-3
12	"	7,040	"	1 00	"	7,040	00
14	"	8,213 1-3	"	1 00	"	8,213	33 1-3
16	"	9,386 2-3	"	1 00	"	9,386	66 2-3
18	"	10,560	"	1 00	"	10,560	00

# TABLE FOR GRAVEL.

Table showing number of cubic yards of gravel required in the construction of one mile of gravel road, of widths varying from 6 feet to 20 feet, and depth from 6 to 12 inches. The within quantities should be multiplied by  $1\frac{1}{2}$  to give the number of cubic yards of loose gravel required to make the within depths of compact gravel.

ONE MILE IN LENGTH.	Number of feet in width.	Number of cubic yards in road 6 inches deep.						Number of cubic yards in road 7 inches deep.						Number of cubic yards in road 8 inches deep.						Number of cubic yards in road 9 inches deep.						Number of cubic yards in road 10 inches deep.						Number of cubic yards in road 11 inches deep.						Number of cubic yards in road 12 inches deep.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		6 ft. wide.	7	8	9	10	11	12	13	14	15	16	17	18	19	20	6 ft. wide.	7	8	9	10	11	12	13	14	15	16	17	18	19	20	6 ft. wide.	7	8	9	10	11	12	13	14	15	16	17	18	19	20	6 ft. wide.	7	8	9	10	11	12	13	14	15	16	17	18	19	20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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12-27	9,58 3 1-3	9,69 7 9	9,81 1 1-9	9,92 5 5-9	10,04 9 12-27	10,16 3 1-3	10,27 7 9	10,39 1 1-9	10,50 5 5-9	10,62 9 12-27	10,74 3 1-3	10,85 7 9	10,97 1 1-9	11,08 5 5-9	11,20 9 12-27	11,32 3 1-3	11,43 7 9	11,55 1 1-9	11,66 5 5-9	11,78 9 12-27	11,90 3 1-3	12,01 7 9	12,13 1 1-9	12,24 5 5-9	12,36 9 12-27	12,48 3 1-3	12,59 7 9	12,71 1 1-9	12,82 5 5-9	12,94 9 12-27	13,06 3 1-3	13,17 7 9	13,29 1 1-9	13,40 5 5-9	13,52 9 12-27	13,64 3 1-3	13,75 7 9	13,87 1 1-9	13,98 5 5-9	14,10 9 12-27	14,22 3 1-3	14,33 7 9	14,45 1 1-9	14,56 5 5-9	14,68 9 12-27	14,80 3 1-3	14,91 7 9	15,03 1 1-9	15,14 5 5-9	15,26 9 12-27	15,38 3 1-3	15,49 7 9	15,61 1 1-9	15,72 5 5-9	15,84 9 12-27	15,96 3 1-3	16,07 7 9	16,19 1 1-9	16,30 5 5-9	16,42 9 12-27	16,54 3 1-3	16,65 7 9	16,77 1 1-9	16,88 5 5-9	17,00 9 12-27	17,12 3 1-3	17,23 7 9	17,35 1 1-9	17,46 5 5-9	17,58 9 12-27	17,70 3 1-3	17,81 7 9	17,93 1 1-9	18,04 5 5-9	18,16 9 12-27	18,28 3 1-3	18,39 7 9	18,51 1 1-9	18,62 5 5-9	18,74 9 12-27	18,86 3 1-3	18,97 7 9	19,09 1 1-9	19,20 5 5-9	19,32 9 12-27	19,44 3 1-3	19,55 7 9	19,67 1 1-9	19,78 5 5-9	19,90 9 12-27	20,02 3 1-3	20,13 7 9	20,25 1 1-9	20,36 5 5-9	20,48 9 12-27	20,60 3 1-3	20,71 7 9	20,83 1 1-9	20,94 5 5-9	21,06 9 12-27	21,18 3 1-3	21,29 7 9	21,41 1 1-9	21,52 5 5-9	21,64 9 12-27	21,76 3 1-3	21,87 7 9	21,99 1 1-9	22,10 5 5-9	22,22 9 12-27	22,34 3 1-3	22,45 7 9	22,57 1 1-9	22,68 5 5-9	22,80 9 12-27	22,92 3 1-3	23,03 7 9	23,15 1 1-9	23,26 5 5-9	23,38 9 12-27	23,50 3 1-3	23,61 7 9	23,73 1 1-9	23,84 5 5-9	23,96 9 12-27	24,08 3 1-3	24,19 7 9	24,31 1 1-9	24,42 5 5-9	24,54 9 12-27	24,66 3 1-3	24,77 7 9	24,89 1 1-9	25,00 5 5-9	25,12 9 12-27	25,24 3 1-3	25,35 7 9	25,47 1 1-9	25,58 5 5-9	25,70 9 12-27	25,82 3 1-3	25,93 7 9	26,05 1 1-9	26,16 5 5-9	26,28 9 12-27	26,40 3 1-3	26,51 7 9	26,63 1 1-9	26,74 5 5-9	26,86 9 12-27	26,98 3 1-3	27,09 7 9	27,21 1 1-9	27,32 5 5-9	27,44 9 12-27	27,56 3 1-3	27,67 7 9	27,79 1 1-9	27,90 5 5-9	28,02 9 12-27	28,14 3 1-3	28,25 7 9	28,37 1 1-9	28,48 5 5-9	28,60 9 12-27	28,72 3 1-3	28,83 7 9	28,95 1 1-9	29,06 5 5-9	29,18 9 12-27	29,30 3 1-3	29,41 7 9	29,53 1 1-9	29,64 5 5-9	29,76 9 12-27	29,88 3 1-3	29,99 7 9	30,11 1 1-9	30,22 5 5-9	30,34 9 12-27	30,46 3 1-3	30,57 7 9	30,69 1 1-9	30,80 5 5-9	30,92 9 12-27	31,04 3 1-3	31,15 7 9	31,27 1 1-9	31,38 5 5-9	31,50 9 12-27	31,62 3 1-3	31,73 7 9	31,85 1 1-9	31,96 5 5-9	32,08 9 12-27	32,20 3 1-3	32,31 7 9	32,43 1 1-9	32,54 5 5-9	32,66 9 12-27	32,78 3 1-3	32,89 7 9	33,01 1 1-9	33,12 5 5-9	33,24 9 12-27	33,36 3 1-3	33,47 7 9	33,59 1 1-9	33,70 5 5-9	33,82 9 12-27	33,94 3 1-3	34,05 7 9	34,17 1 1-9	34,28 5 5-9	34,40 9 12-27	34,52 3 1-3	34,63 7 9	34,75 1 1-9	34,86 5 5-9	34,98 9 12-27	35,10 3 1-3	35,21 7 9	35,33 1 1-9	35,44 5 5-9	35,56 9 12-27	35,68 3 1-3	35,79 7 9	35,91 1 1-9	36,02 5 5-9	36,14 9 12-27	36,26 3 1-3	36,37 7 9	36,49 1 1-9	36,60 5 5-9	36,72 9 12-27	36,84 3 1-3	36,95 7 9	37,07 1 1-9	37,18 5 5-9	37,30 9 12-27	37,42 3 1-3	37,53 7 9	37,65 1 1-9	37,76 5 5-9	37,88 9 12-27	38,00 3 1-3	38,11 7 9	38,23 1 1-9	38,34 5 5-9	38,46 9 12-27	38,58 3 1-3	38,69 7 9	38,81 1 1-9	38,92 5 5-9	39,04 9 12-27	39,16 3 1-3	39,27 7 9	39,39 1 1-9	39,50 5 5-9	39,62 9 12-27	39,74 3 1-3	39,85 7 9	39,97 1 1-9	40,08 5 5-9	40,20 9 12-27	40,32 3 1-3	40,43 7 9	40,55 1 1-9	40,66 5 5-9	40,78 9 12-27	40,90 3 1-3	41,01 7 9	41,13 1 1-9	41,24 5 5-9	41,36 9 12-27	41,48 3 1-3	41,59 7 9	41,71 1 1-9	41,82 5 5-9	41,94 9 12-27	42,06 3 1-3	42,17 7 9	42,29 1 1-9	42,40 5 5-9	42,52 9 12-27	42,64 3 1-3	42,75 7 9	42,87 1 1-9	42,98 5 5-9	43,10 9 12-27	43,22 3 1-3	43,33 7 9	43,45 1 1-9	43,56 5 5-9	43,68 9 12-27	43,80 3 1-3	43,91 7 9	44,03 1 1-9	44,14 5 5-9	44,26 9 12-27	44,38 3 1-3	44,49 7 9	44,61 1 1-9	44,72 5 5-9	44,84 9 12-27	44,96 3 1-3	45,07 7 9	45,19 1 1-9	45,30 5 5-9	45,42 9 12-27	45,54 3 1-3	45,65 7 9	45,77 1 1-9	45,88 5 5-9	46,00 9 12-27	46,12 3 1-3	46,23 7 9	46,35 1 1-9	46,46 5 5-9	46,58 9 12-27	46,70 3 1-3	46,81 7 9	46,93 1 1-9	47,04 5 5-9	47,16 9 12-27	47,28 3 1-3	47,39 7 9	47,51 1 1-9	47,62 5 5-9	47,74 9 12-27	47,86 3 1-3	47,97 7 9	48,09 1 1-9	48,20 5 5-9	48,32 9 12-27	48,44 3 1-3	48,55 7 9	48,67 1 1-9	48,78 5 5-9	48,90 9 12-27	49,02 3 1-3	49,13 7 9	49,25 1 1-9	49,36 5 5-9	49,48 9 12-27	49,60 3 1-3	49,71 7 9	49,83 1 1-9	49,94 5 5-9	50,06 9 12-27	50,18 3 1-3	50,29 7 9	50,41 1 1-9	50,52 5 5-9	50,64 9 12-27	50,76 3 1-3	50,87 7 9	50,99 1 1-9	51,10 5 5-9	51,22 9 12-27	51,34 3 1-3	51,45 7 9	51,57 1 1-9	51,68 5 5-9	51,80 9 12-27	51,92 3 1-3	52,03 7 9	52,15 1 1-9	52,26 5 5-9	52,38 9 12-27	52,50 3 1-3	52,61 7 9	52,73 1 1-9	52,84 5 5-9	52,96 9 12-27	53,08 3 1-3	53,19 7 9	53,31 1 1-9	53,42 5 5-9	53,54 9 12-27	53,66 3 1-3	53,77 7 9	53,89 1 1-9	54,00 5 5-9	54,12 9 12-27	54,24 3 1-3	54,35 7 9	54,47 1 1-9	54,58 5 5-9	54,70 9 12-27	54,82 3 1-3	54,93 7 9	55,05 1 1-9	55,16 5 5-9	55,28 9 12-27	55,40 3 1-3	55,51 7 9	55,63 1 1-9	55,74 5 5-9	55,86 9 12-27	55,98 3 1-3	56,09 7 9	56,21 1 1-9	56,32 5 5-9	56,44 9 12-27	56,56 3 1-3	56,67 7 9	56,79 1 1-9	56,90 5 5-9	57,02 9 12-27	57,14 3 1-3	57,25 7 9	57,37 1 1-9	57,48 5 5-9	57,60 9 12-27	57,72 3 1-3	57,83 7 9	57,95 1 1-9	58,06 5 5-9	58,18 9 12-27	58,30 3 1-3	58,41 7 9	58,53 1 1-9	58,64 5 5-9	58,76 9 12-27	58,88 3 1-3	58,99 7 9	59,11 1 1-9	59,22 5 5-9	59,34 9 12-27	59,46 3 1-3	59,57 7 9	59,69 1 1-9	59,80 5 5-9	59,92 9 12-27	60,04 3 1-3	60,15 7 9	60,27 1 1-9	60,38 5 5-9	60,50 9 12-27	60,62 3 1-3	60,73 7 9	60,85 1 1-9	60,96 5 5-9	61,08 9 12-27	61,20 3 1-3	61,31 7 9	61,43 1 1-9	61,54 5 5-9	61,66 9 12-27	61,78 3 1-3	61,89 7 9	62,01 1 1-9	62,12 5 5-9	62,24 9 12-27	62,36 3 1-3	62,47 7 9	62,59 1 1-9	62,70 5 5-9	62,82 9 12-27	62,94 3 1-3	63,05 7 9	63,17 1 1-9	63,28 5 5-9	63,40 9 12-27	63,52 3 1-3	63,63 7 9	63,75 1 1-9	63,86 5 5-9	63,98 9 12-27	64,10 3 1-3	64,21 7 9	64,33 1 1-9	64,44 5 5-9	64,56 9 12-27	64,68 3 1-3	64,79 7 9	64,91 1 1-9	65,02 5 5-9	65,14 9 12-27	65,26 3 1-3	65,37 7 9	65,49 1 1-9	65,60 5 5-9	65,72 9 12-27	65,84 3 1-3	65,95 7 9	66,07 1 1-9	66,18 5 5-9	66,30 9 12-27	66,42 3 1-3	66,53 7 9	66,65 1 1-9	66,76 5 5-9	66,88 9 12-27	67,00 3 1-3	67,11 7 9	67,23 1 1-9	67,34 5 5-9	67,46 9 12-27	67,58 3 1-3	67,69 7 9	67,81 1 1-9	67,92 5 5-9	68,04 9 12-27	68,16 3 1-3	68,27 7 9	68,39 1 1-9	68,50 5 5-9	68,62 9 12-27	68,74 3 1-3	68,85 7 9	68,97 1 1-9	69,08 5 5-9	69,20 9 12-27	69,32 3 1-3	69,43 7 9	69,55 1 1-9	69,66 5 5-9	69,78 9 12-27	69,90 3 1-3	70,01 7 9	70,13 1 1-9	70,24 5 5-9	70,36 9 12-27	70,48 3 1-3	70,59 7 9	70,71 1 1-9	70,82 5 5-9	70,94 9 12-27	71,06 3 1-3	71,17 7 9	71,29 1 1-9	71,40 5 5-9	71,52 9 12-27	71,64 3 1-3	71,75 7 9	71,87 1 1-9	71,98 5 5-9	72,10 9 12-27	72,22 3 1-3	72,33 7 9	72,45 1 1-9	72,56 5 5-9	72,68 9 12-27	72,80 3 1-3	72,91 7 9	73,03 1 1-9	73,14 5 5-9	73,26 9 12-27	73,38 3 1-3	73,49 7 9	73,61 1 1-9	73,72 5 5-9	73,84 9 12-27	73,96 3 1-3	74,07 7 9	74,19 1 1-9	74,30 5 5-9	74,42 9 12-27	74,54 3 1-3	74,65 7 9	74,77 1 1-9	74,88 5 5-9	75,00 9 12-27	75,12 3 1-3	75,23 7 9	75,35 1 1-9	75,46 5 5-9	75,58 9 12-27	75,70 3 1-3	75,81 7 9	75,93 1 1-9	76,04 5 5-9	76,16 9 12-27	76,28 3 1-3	76,39 7 9	76,51 1 1-9	76,62 5 5-9	76,74 9 12-27	76,86 3 1-3	76,97 7 9	77,09 1 1-9	77,20 5 5-9	77,32 9 12-27	77,44 3 1-3	77,55 7 9	77,67 1 1-9	77,78 5 5-9	77,90 9 12-27	78,02 3 1-3	78,13 7 9	78,25 1 1-9	78,36 5 5-9	78,48 9 12-27	78,60 3 1-3	78,71 7 9	78,83 1 1-9	78,94 5 5-9	79,06 9 12-27	79,18 3 1-3	79,29 7 9	79,41 1 1-9	79,52 5 5-9	79,64 9 12-27	79,76 3 1-3	79,87 7 9	79,99 1 1-9	80,10 5 5-9	80,22 9 12-27	80,34 3 1-3	80,45 7 9	80,57 1 1-9	80,68 5 5-9	80,80 9 12-27	80,92 3 1-3	81,03 7 9	81,15 1 1-9	81,26 5 5-9	81,38 9 12-27	81,50 3 1-3	81,61 7 9	81,73 1 1-9	81,84 5 5-9	81,96 9 12-27	82,08 3 1-3	82,19 7 9	82,31 1 1-9	82,42 5 5-9	82,54 9 12-27	82,66 3 1-3	82,77 7 9	82,89 1 1-9	83,00 5 5-9	83,12 9 12-27	83,24 3 1-3	83,35 7 9	83,47 1 1-9	83,58 5 5-9	83,70 9 12-27	83,82 3 1-3	83,93 7 9	84,05 1 1-9	84,16 5 5-9	84,28 9 12-27	84,40 3 1-3	84,51 7 9	84,63 1 1-9	84,74 5 5-9	84,86 9 12-27	84,98 3 1-3	85,09 7 9	85,21 1 1-



---

---

# INDEX.

---

---

(213)



# Illustrations.

---

New Jersey Road Exhibit at Louisiana Purchase Exposition... Frontispiece.

	Page.
Dredge, Pumping and Discharging Sand, Atlantic City Boulevard, Atlantic County . . . . .	Facing 23
Red Lion and Vincentown Road, Burlington County. Before and After Improvement . . . . .	Facing 25
Ocean City Turnpike, Cape May County. After Improvement.	Facing 26
Pfinceton Hill Road, Mercer County. Before and After Improvement . . . . .	Facing 29
Bridge Approach, Ridgeway Avenue and Fourth Street, Middlesex County. Before and After Improvement . . . . .	Facing 32
Lawrence Harbor Road, Middlesex County. Before and After Improvement . . . . .	Facing 34
Manalapan and Freehold Road, Monmouth County. Before and After Improvement . . . . .	Facing 35
Stafford Township, Main Shore Road, Ocean County. During and After Improvement . . . . .	Facing 37
Union Township Main Shore Road, Ocean County. Before and After Improvement . . . . .	Facing 38
Oyster Creek Branch, Union Township Main Shore Road, Ocean County. Before and After Improvement . . . . .	Facing 39
Salem and Pennsville Road, Salem County. Before and After Improvement . . . . .	Facing 40
Peapack Road, Somerset County. During and After Improvement . . . . .	Facing 42
Mountain Avenue, Bound Brook, Somerset County. Before and After Improvement . . . . .	Facing 43
Mountain Avenue, Bound Brook, Somerset County. Before and After Improvement . . . . .	Facing 44
Tuttle's Corner Road, Sussex County. Before and After Improvement . . . . .	Facing 45
Danville Road, Warren County. Before and During Improvement . . . . .	Facing 46
Morris Turnpike, Warren County. Before and After Improvement . . . . .	Facing 47

Roxburg Road, Warren County, Showing Changed Line, Before and After Improvement.....	Facing	48
View of Road Exhibit from Model Street Bungalow on left.....	Facing	57
Closer View Showing Successive Courses of Stone.....	Facing	57
Successive Courses of Telford Construction.....	Facing	60
Bitulithic Pavement, Main Street, Woodstown, Salem County..	Facing	79
Tuckahoe Gravel Pit, Showing Distribution of Material.....	Facing	89
Salt Meadows, Atlantic County .....	Facing	91
Pleasantville and Atlantic City Boulevard, Atlantic County, Showing Sod Banks .....	Facing	91
Ocean City Turnpike, Cape May County, After Improvement..	Facing	96
Mauricetown Bridge Road, Cumberland County. During Improvement .....	Facing	97
Princeton Hill Road, Mercer County. During and After Improvement .....	Facing	100
Princeton Hill Road, Mercer County. During and After Improvement .....	Facing	101
Landing Bridge and New Market Road, Middlesex County. Before and After Improvement ..	Facing	102
Sayreville Road, Middlesex County. Before and After Improvement .....	Facing	104
Manalapan and Freehold Road, Monmouth County. Before and After Improvement .....	Facing	107
Mount Freedom Road, Morris County, During and After Improvement .....	Facing	109
Eagleswood Main Shore Road, Ocean County. Before and After Improvement .....	Facing	110
Union Township Main Shore Road, Ocean County. Before and After Improvement .....	Facing	112
Ocean Township Main Shore Road, Before and After Improvement.....	Facing	113
Tuttle's Corner Road, Sussex County. Before and After Improvement .....	Facing	121
Morris Turnpike, Warren County. Before and After Improvement .....	Facing	124
Roxburgh Road, Warren County. Before and After Improvement .....	Facing	125

# INDEX.

---

	Page.
Acquirement of Turnpikes . . . . .	188-192
Amount Available for Road Building in Each County . . . . .	17
Amount Expended in Each County to Date . . . . .	16
Appeal for Increased Appropriation . . . . .	53-54
Appendix A, . . . . .	129
Standard Specifications for Gravel Roads . . . . .	144-159
Standard Specifications for Stone Roads . . . . .	129-143
Appendix B, Road Law of 1903 . . . . .	161-170
Bonds, Interest Payable Annually or Semi-annually . . . . .	176-177
Boundary Roads . . . . .	186-188
Broad Tires . . . . .	194-195
Brush, Briers and Weeds Must Be Removed . . . . .	198-199
Changing Location and Vacating . . . . .	174-176
Changing Location and Improving . . . . .	181-182
Freeholders, Power to Borrow . . . . .	185
Increased Power to Borrow . . . . .	183-184
Inter County Roads, Improvement of . . . . .	170-172
Sidewalks, Supplement Authorizing Grading of . . . . .	173-174
Townships, State Aid to . . . . .	1780-18
Turnpikes . . . . .	188-194
Acquirement of . . . . .	188-192
Commissioners, Compensation of . . . . .	195-196
Commissioners, Proviso in Case of Death or Disqualification . . . . .	196-197
Vacation of . . . . .	192-194
Appendix C. . . . .	291
Laying Out Roads . . . . .	202-203
Laying Out, Vacating and Altering . . . . .	203-204
Summary of Road Laws . . . . .	201-202
Vacation and Relaying by Filing Consent with Clerk and Recording . . . . .	204-205
Vacation of Public Roads by Consent and Filing with County Clerk . . . . .	205-206
Appendix D. Tables . . . . .	207-212
Number of Tons of Stone Required Per Mile . . . . .	207-208
Square Yards Per Mile and Cost . . . . .	209-211
Quantity of Gravel Per Mile . . . . .	212

Are Our Roads Permanently Satisfactory, J. J. Albertson .....	71-74
Bitulithic Pavement, Robert Gwynne, Jr .....	79-81
Bonds, Interest Payable Annually or Semi-Annually .....	176-177
Boundary Roads .....	186-188
Broad Tires .....	194-195
Brush, Briers and Weeds Must Be Removed .....	198-199
Changing Location and Vacating .....	174-176
Changing Location and Improving .....	181-182
Commissioners, Compensation of .....	195-196
Commissioners, Proviso in Case of Death or Disqualification .....	196-197
Cost of Roads .....	5-9
Description of Roads Built in 1904 .....	23
Atlantic County .....	23
Bergen County .....	23-25
Burlington County .....	25-26
Camden County .....	26
Cape May County .....	26-27
Cumberland County .....	27
Essex County .....	28
Mercer County .....	29-31
Middlesex County .....	31-35
Monmouth County .....	35
Morris County .....	36-37
Ocean County .....	37-39
Passaic County .....	39-40
Salem County .....	40-42
Somerset County .....	42-44
Sussex County .....	44-45
Union County .....	45-46
Warren County .....	46-48
Earth Roads .....	55-56
Freeholders, Power to Borrow .....	185
Gravel Pits, List of .....	89-90
Increased Power to Borrow .....	183-184
Inter County Roads, Improvement of .....	170-172
Interest Payable Annually or Semi-Annually .....	176-177
Laying Out Roads .....	202-203
Laying Out, Vacating and Altering .....	203-204
Louisiana Purchase Exposition, New Jersey Road Exhibit at, Robert A. Meeker .....	57-60
Meadow Roads a Successful Experiment, Stillwell H. Townsend .....	75-77
Names and Lengths of Roads Built in 1904 .....	14-16
Oiled Roads .....	61-66
Plank Roads, Widening of .....	197-198
Quarries, List of .....	87-88
Roads Approaching Completion, Cost of .....	9-10
Roads Building and to be Built .....	10-12

Roads Petitioned for . . . . .	
Atlantic County . . . . .	17
Burlington County . . . . .	18
Camden County . . . . .	18
Cumberland County . . . . .	18
Essex County . . . . .	18-19
Gloucester County . . . . .	19
Hudson County . . . . .	19
Hunterdon County . . . . .	19
Mercer County . . . . .	19
Middlesex County . . . . .	19
Monmouth County . . . . .	20
Morris County . . . . .	20
Ocean County . . . . .	20
Passaic County . . . . .	20
Salem County . . . . .	20
Somerset County . . . . .	21
Road Construction, Facts and Fallacies of, Josiah Miller . . . . .	83-86
Road Improvement in New Jersey for the year 1904, H. I. Budd, Commissioner . . . . .	49-53
Road Law of 1903 . . . . .	161-170
Road Maintenance, Peter Forman . . . . .	67-69
Sidewalks, Supplement Authorizing Grading of . . . . .	173-174
Statements by Engineers and Supervisors . . . . .	91
Atlantic County . . . . .	91
Bergen County . . . . .	91-94
Burlington County . . . . .	94-96
Camden County . . . . .	96
Cape May County . . . . .	96-97
Cumberland County . . . . .	97-98
Essex County . . . . .	98-99
Mercer County . . . . .	99-102
Middlesex County . . . . .	102-107
Monmouth County . . . . .	107-108
Morris County . . . . .	109-110
Ocean County . . . . .	110-113
Passaic County . . . . .	113-115
Salem County . . . . .	115-117
Somerset County . . . . .	118-120
Sussex County . . . . .	121
Union County . . . . .	121-122
Warren County . . . . .	122-126
Specifications, Standard Gravel . . . . .	144-159
Specifications, Standard Stone . . . . .	129-143
Summary of Road Laws . . . . .	201-202
Table Gravel . . . . .	212
Table, Number of Miles of Roads Improved in Each County . . . . .	13

Table, Number of Tons of Stone Per Mile and Cost.....	207-208
Table, Square Yards Per Mile and Cost.....	209-211
Townships, State Aid to .....	178-180
Turnpikes .....	188-194
Vacation and Relaying by Filing Consent with Clerk and Record- ing .....	204-205
Vacation of Public Roads by Consent and Filing with County Clerk.	205-206
Wide Tires, Necessity of Legislation for .....	54-55





